RAILROAD GAZETTE

FRIDAY, SEPT. 8, 1893.

CONTENTS.

	PAGE.
ILLUSTRATIONS:	
Memphis Bridge	664
Ten-Ton Locomotive Crane	666
Delaware, Lackawanna & Western 10-Wheel Passenger Engine	667
Ash Pit on the Pennsylvania Railroad	668
CONTRIBUTIONS:	
Essential Elements of Auto-Manual Block Signals	663
Steam Heat or Baker Heaters	663
The Texas Stock and Bond Law	663
Rubble Concrete	663
EDITORIALS:	
Brick Lined or Water Lined Fireboxes	672
Responsibility for the Long Island Collision	672
Joint Rates and the Long-and-Short Law	673
July Accidents	673
EDITORIAL NOTES	672, 675
NEW PUBLICATIONS	675
TRADE CATALOGUES	675
GENERAL NEWS:	
Locomotive Building	677
Car Building	677
GENERAL NEWS:	PAGE.
Bridge Building	677
Railroad Law	677
Meetings and Announcements	678
Personal	678
Elections and Appointments	678
Railroad Construction	679
General Railroad News	679
Traffic	680
MISCELLANEOUS:	
Technical	675
The Scrap Heap	676
Bridge Disaster on the Boston & Albany	633
The Berlin Electric Railroad	667
Boilers at the World's Fair	637
Resistance of Cars on Curves	668
The Duty of a Railroad Company to Its Employees	670
Train Accidents in the United States in July	670
The Weather and the Railroads in India	671
European Practice in Locomotive and Car Wheel Tires	675

Contributions.

Essential Elements of Auto-Manual Block Signals.

NEW YORK, Sept. 5, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I think it will be generally conceded that the recent accident on the Long Island Railroad, stated to be due to the negligence of Towerman Knott, could not have occurred had the signals been controlled by a proper system of lock and block signaling, known in the United States as the Sykes system. A very close study and active connection with lock and block signaling, extending over several years, may permit me to enumerate the following features as essential to success in working.

1. The electro-mechanical lock upon the signal must be so constructed that instead of its withdrawal being effected, as heretofore, either by energization of the magnet by an instantaneous or short period current to attract the locking piece from its locking position, or, as in the Sykes system, instant de-energization of the magnet to cause the locking piece to fall from its locking position, the said locking piece should be manually placed to the poles of the magnet out of locking position, during which movement an auxiliary locking piece takes its place, the main locking piece being held out of locking position by a constant current in the coils. A properly constructed electro-mechanical lock on this principle insures the following advantages in practice:

1. No delicate construction or adjustments, either in the workshop or during maintenance of the parts in active service. It overcomes those difficulties which have resulted from careless plunging by an operator to effect an unlock. This evil (although presumably the error is on the side of safety), by creating a block, demoralizes traffic. A device which obviates it is all-important.

2. The system should provide that the circuit on the outside line wire must be made and broken before the lock can be removed from the signal, and in such manner that a make and break by a lightning current is inoperative; and this should in no way depend upon the proper observance of rules or working of instruments by the operator.

3. It is claimed that the lock and block system makes a machine of the man, and does not tax his sight, memory or intelligence to prevent accident. The working of the system should also call for a minimum of his attention and intelligence, and mistakes which he might make under hurry, excitement or ill health should neither block the road nor unlock the signal.

HENRY BEZER,
Signal Engineer.

Steam Heat or Baker Heaters.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of Aug. 18 an article from Mr. Crafts, Clerk of the Massachusetts Railroad Commissioners, wherein he makes misleading statements in regard to heating railroad cars by steam. About a month before the death of the lamented Mr. James P. Furber, Vice-President and General Manager of the entire system of Maine railroads, he made the remark to the writer, in his office in Boston, that the whole system of steam heating was a "confounded nuisance." He stated substantially that it was unsatisfactory to the passengers as well as to the railroad company—they were obliged to go to a great extra expense in substituting steam for the system in general use—the Baker heaters. Mr. Furber cited to me several instances where passengers had suffered from the want of heat, there being no fires in the cars, and no steam that could be spared from the locomotive, the locomotive being, in many instances, not where the cars were.

Of course it is Mr. Crafts' duty to advocate the law promulgated by his state, but he does not reflect the public sentiment on that subject. If the statements of the traveling public were given in the place of his semi-official statements, there would be nothing but complaints and the most severe invectives against the use of steam, not only because it is usually inoperative when it is most needed, but when it is used, its undeviating high temperature renders the atmosphere more like an oven than a public conveyance.

The fact is, the heating of cars from the locomotive has everywhere been a failure so far as its real merits are taken into consideration. We do not want any more *prima facie* evidence on this subject—evidence which is more politic than truthful. It is natural that railroad companies that have gone to vast expense, and that those in charge who have committed themselves to what they supposed was a good change, would be loath to admit that the change was *not* a success. But if the voice of the traveling public could be heard on this subject there would be a unanimous exclamation of disapproval that the old, well known and well tried hot water system had, in any instance, been changed for the uncertain, ill adapted steam for heating passenger cars.

WILLIAM C. BAKER.

[The Baker heater is a most excellent apparatus as now arranged, there is no doubt about that; but Mr. Baker has a big chore on hand when he undertakes to beat the steam heating systems on fundamental principles.—EDITOR RAILROAD GAZETTE.]

The Texas Stock and Bond Law.

AUSTIN, Tex., Aug. 19, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The railroad stock and bond law has been in effect 11 days. This is the most momentous move which Texas has made in railroad matters for some time. The object of the act is to regulate and restrict the issuance of railroad stocks and bonds, and its scope has already been set forth in your columns (*Railroad Gazette*, Aug. 4). Its authors assert that it will result in the elimination of all fictitious and dishonest values and will make Texas railroad bonds the best securities in the market, while others declare that it will only result in the discouragement of railroad building and depress the interests already existing.

I have seen a letter from Vice-President Charles Hamilton printed in a recent issue of the *Railroad Gazette* (Aug. 4), and I judge that he inclines to the belief that this law is not only discouraging, but is responsible for the present inactivity in the way of construction and improvement; but the law did not go into effect until 90 days after it was passed, and in that time the railroads had an excellent opportunity to protect themselves from its provisions, an opportunity which was not neglected, for prior to the 8th of August they made full legal provision for the issuance of something over $25,000,000 stocks and bonds in addition to what was in existence 90 days before.

The first road to adopt this wise precaution was the Texas Central, which filed resolutions May 17 authorizing the issuance of $2,000,000 six per cent. bonds in addition to the $3,999,000 already provided for. Other roads took time by the forelock, as follows: The South Galveston & Gulf Shore, $375,000 bonds and $350,000 increase of capital stock; Chicago, Rock Island & Texas, bonds to the extent of $20,000 per mile of all their lines in Texas, actual and prospective; Dallas & Fort Worth Rapid Transit Company, $1,000,000 bonds and $600,000 increase of capital stock; Texarkana & Ft. Smith, bonds "to the extent of, but not to exceed in the aggregate, its entire bonded indebtedness," the sum of $25,000 per mile of road, actual and contemplated; Sherman, Shreveport & Southern, $6,000,000 bonds; Houston, East & West Texas, "bonds at the rate of $20,000 per mile of its finished line"; Texas & New Orleans, bonds $4,195,000; Velasco Terminal, bonds, $800,000; Denison & Washita Valley, an amendatory and supplemental mortgage to the Manhattan Trust Company, of New York, changing its issue of bonds from $20,000 per mile to an aggregate of $1,000,000; Beaumont & Kansas City, bonds $150,000. In nearly every instance the bonds are issued to secure money for the purpose of improvements and extensions. There is no law in Texas to prevent raising money on the bonds, and with all these millions to be put into railroad construction the moment the money can be found, it is evident the stock and bond law is not wholly responsible for the stagnation said to exist.

Though there was some talk on the part of the state looking to injunction proceedings relative to the bonds above quoted, no steps were taken and nothing can now be done. It is a significant fact that most of the larger roads have made no move in the matter, and as there is little doubt some of them will want to make a new issue of bonds before long, interesting developments in that line are expected.

B.

Rubble Concrete.

NEW YORK, Sept. 1, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The use of rubble concrete, as it is termed, that is to say, of masonry composed of large unwrought stones with the spaces around them filled with concrete masonry of small stones, which was recently described in *Engineering* at considerable length and has been mentioned as quite a new departure in construction, is by no means a novelty in this country.

The first large work of this character of which the writer has any knowledge was the storage reservoir dam at Boyd's Corners, in Putnam County, New York, which was built in 1867-70 after the designs of Gen. Geo. S. Greene, and which was fully described in a paper published in the *Transactions* of the Am. Soc. C. E. in 1874. It is probable that the young American engineer who should undertake to follow the advice of the writer in *Engineering* with reference to the construction of rubble masonry would encounter the same difficulties which were met with in the construction of the Boyd's Corners dam, particularly if the work was to be done by ordinary contractors and not by day's labor under the supervision of a very conscientious and scrupulously attentive engineer in charge of the work, which is the only way in which perfect success could be attained.

The Scotch practice as described in *Engineering* was in laying each course to lay the large blocks of stone close together, limiting the distance between them to three inches and then filling the spaces between them with concrete, which was carefully "rammed and probed all around with a trowel to leave no interstices," then a layer of concrete six inches thick was put on and leveled and another course of rubble stones placed as before. The face of the masonry appears to have been of concrete laid against wooden forms, adjoining which the three inches of concrete was "carefully worked with trowels, so as to leave the face quite smooth without any rendering or dressing."

The experience of the writer in that class of work, when put in by contract, has been that to obtain a proper filling of the space between the large stones, it is necessary to make such space not less than 12 in at any point, and even with that distance it is difficult to get the spaces thoroughly filled and rammed.

As stated in the paper above mentioned, when the area over which the concrete is to be laid was largely covered "with irregular shaped stones placed 18 in. or two feet apart, it was difficult to get an even bearing for run plank and almost impracticable for a tramway. The odds were greatly against the concrete being properly distributed and rammed if it was dumped from a car; even when distributed by the barrowful (two cubic feet) it required constant attention and no small amount of persistence to secure its being spread in the narrow spaces."

Concrete when laid against an unplastered vertical stone surface will not make a close joint, the mortar will not fill the spaces even with thorough ramming, and the face next the stone will be honeycombed, consequently all the surfaces of large stones must be plastered before the concrete is put in, and it is almost impossible to secure this being effectively done where the spaces are narrow.

The conclusions reached by the writer with regard to the use of large stone in concrete at that time have been sustained by later experience. These were, that it is economical and advantageous to use large unwrought stones in a large mass of concrete, but that the stone should be quite regular in shape, should be of not more than 18 in. rise, and should not be placed closer together than two feet horizontally, and should have at least six inches of concrete between layers or courses.

J. J. R. CROES.

Bridge Disaster on the Boston & Albany.

Eastbound passenger train No. 16, of the Boston & Albany road, broke through Willcutt's bridge 1¼ miles east of Chester, Mass., at 12:30 P. M., on Aug. 31, and 9 passengers and 4 trainmen were killed and 25 passengers and 3 trainmen were injured. One of these trainmen subsequently died, making 14 deaths up to date. The train consisted of 10-wheel engine No. 12, weighing 132,800 lbs., recently built by the Rhode Island Locomotive Works; a buffet car with baggage compartment, three Wagner sleeping cars and three ordinary cars. The speed is said to have been about 20 miles an hour, but very likely was faster. The engine crossed the bridge and fell down the bank on the east side. The tender and first four cars fell into the Westfield River, 20 ft. below, and the three passenger cars remained on the west bank. The first of these three cars was badly crushed at the front end. The cars which fell into the stream were completely wrecked.

The bridge was of iron, a riveted through truss, built in 1874, by the Niagara Bridge Company. There were two spans, of 104 and 110 ft. respectively. The floor system had recently been strengthened, to fit it for heavier locomotives than those heretofore used, and the work of strengthening the top chords was in progress at the time of the disaster; but the workmen were at dinner, on the ground near by, and none of them was injured. There seems to be no doubt that the weakening of the top chord, preparatory to putting on additional plates, was the cause of the failure of the bridge. The official hearing by the state railroad commissioners has not been begun as we go to press, but the evidence already published in the newspapers shows that a large number of bolts had been taken out and not replaced, and that at least one top chord plate was off.

The work on the bridge was being done by a gang of 13 men furnished by the R. F. Hawkins Iron Works, of Springfield, Mass., this concern having furnished the material. The bridge company furnished a foreman, J. D. Reed, who took charge of the work on several bridges, and a sub-foreman, Daniel Belville, who was in charge

of the work on this particular bridge. There was no inspector on behalf of the railroad company, and it is said that Foreman Reed took his instructions direct from Mr. Chamberlain, bridge engineer of the road. Belville is a middle-aged French Canadian who has worked for the Hawkins company four years. He lays no claim to a knowledge of bridge designing or construction. He was on the ground superintending the cutting up of the ruined bridge three days after the disaster.

From notes gathered by reporters it appears that when the floor was being strengthened trains were required to reduce speed on crossing this bridge, but that at the time of this accident no such speed rule was in effect. This indicates that the engineer in charge intended to carry on the work without impairing the strength of the bridge to any serious extent, even temporarily. The Boston & Albany has been noted for its cautious methods and for making its bridges of ample strength regardless of expense.

The Memphis Bridge—Bearings and Suspension Joints.

We gave, Aug. 4, a description of the method of erecting one of the intermediate spans of the Memphis Bridge. A description of the fixed and expansion bearings and expansion joints follows. This is also taken from Mr. Morison's paper prepared for the International Engineering Congress, being reprinted from advance sheets of the *Transactions* of the American Society of Civil Engineers.

The superstructure and moving load throw on each of the two points of support on Piers I., II. and III. a weight of about 2,000 tons; this weight, however, being thrown directly over the axis of the pier. To distribute this weight properly on the masonry requires an area of about 100 sq. ft. and a sufficient height between the masonry and the chords of the superstructure to distribute it with some degree of uniformity. On Piers I. and III. the bearings are fixed. They are shown on Plate VII. In each instance the weight is transferred first to a 14-in. pin passing through the centre of the chord. The three posts, one vertical and two inclined, rest on this pin, being made with semi-circular pin bearings at the ends, no pin plates passing around the pins, this arrangement being adopted partly

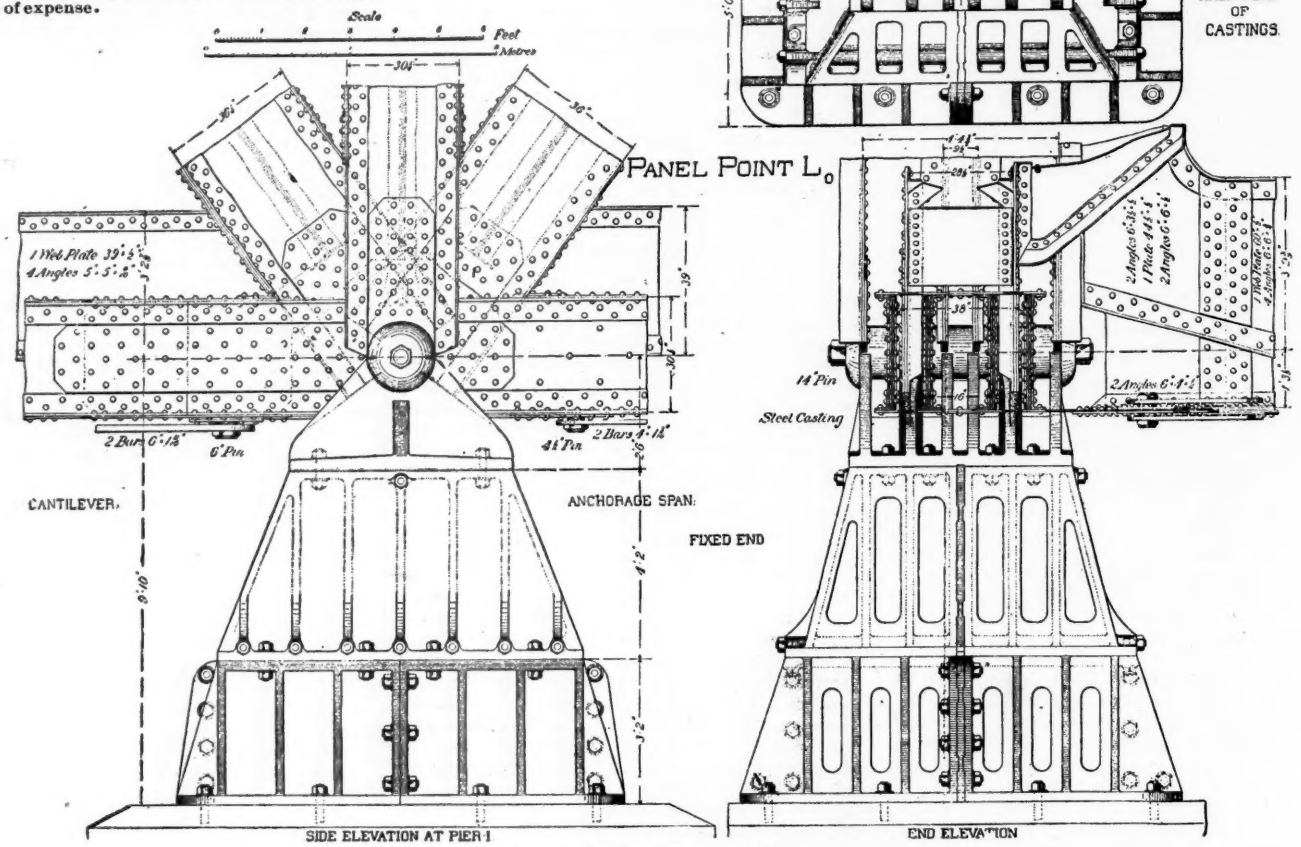


Plate 7—Bearings, Piers I. and II.

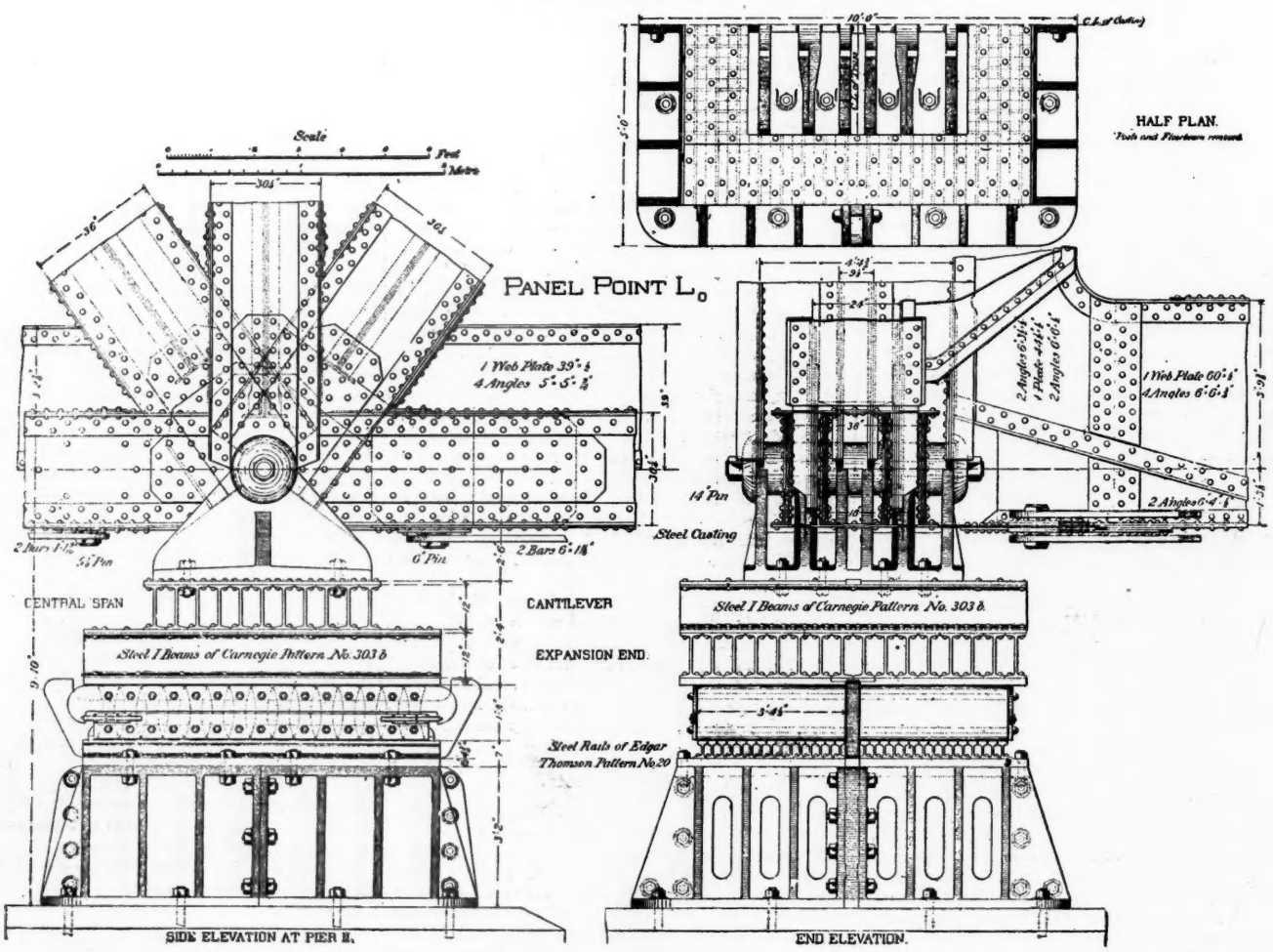


Plate 8—Expansion Bearing, Pier II.

MEMPHIS BRIDGE.

for convenience in erection and partly because the weight always carried here is so great that nothing approaching to tension can ever exist. This 14-in. pin rests on a steel casting, cast with ribs placed directly under the bearings of the posts on the pin. The inclined posts are two-web posts, and the vertical posts four-web posts, but they are so packed that the whole weight is transferred to six ribs in the castings. The steel casting rests on two iron castings which are packed with long bolts and locked together with a grooved steel plate between them. These two castings rest again on four castings, which are locked together in the same manner at the centre. The whole was fastened together by turned bolts passing through drilled holes. The actual weight of each pedestal casting between the pin and the masonry is about 45 tons. The centre of the 11-in. pin is 9 ft. 10 in. above the masonry, which brings the top of the stringer of the bridge 13 ft. above the masonry.

On Pier II. the bearing, which carries the same weight as those on Piers I. and III., had to be made an expansion bearing to allow of the expansion of the central span, temperature alone here representing an expansion of about 8 ins. It is shown on Plate VIII. The piers are slender and the expansion great; it was therefore deemed necessary to provide a joint which would move with the least possible friction and which should not be liable ever to become clogged or stopped by the collection of dirt. The joint must also be so arranged that the structure would be held laterally and the motion limited longitudinally. It was therefore determined to use rollers 15 ins. in diameter and to make these segmental rollers of a pattern resembling the European practice, the rollers being placed 6 ins. between centres.

Each expansion bearing as constructed consists, first, of a steel casting precisely similar to those used at the fixed end. This steel casting rests on a bolster composed of a horizontal top plate, then of 11 12-in. I-beams running transversely, of a second horizontal plate, of 16 12-in. I-beams running longitudinally, and of a third and thicker horizontal plate, the lower surface of which is polished smooth. It had originally been intended to make this bolster of two steel castings with a planed steel plate between them, and this arrangement would have been preferred; but the delays in getting the castings and the uncertainty of securing the finished product in time, made it necessary (after three castings had been made and rejected) to change the plan.

Under the bolsters came the rollers. The rollers are in two lengths and are separated by two steel guide plates, one of which is built in between the polished bottom plates of the bolster and the other between the iron castings below. These serve as the transverse guides. There are 30 rollers in each joint, 15 on each side of the central guides. The rolling surfaces of these rollers are polished, and each roller has two holes drilled completely through it, through which pass turned rods, so that the rollers on one side of the centre must always work with those on the other, while the distances between the rollers are kept constant by two side-plates drilled to fit therods, the rods being held in place by nuts outside the side-plates. The upper side-plates are made with hooked ends, which, striking against the ends of the lower side-plates, limit the possible motion of the rollers and prevent any possible overturning.

Under the rollers is the bearing plate (commonly called the rail plate). This is of the pattern which the engineer has used universally for the last 10 years. It is formed of T rails riveted on a plate below, the tops of the rails being about ¼ in. apart, and the top surfaces planed and polished. This arrangement makes a stiff

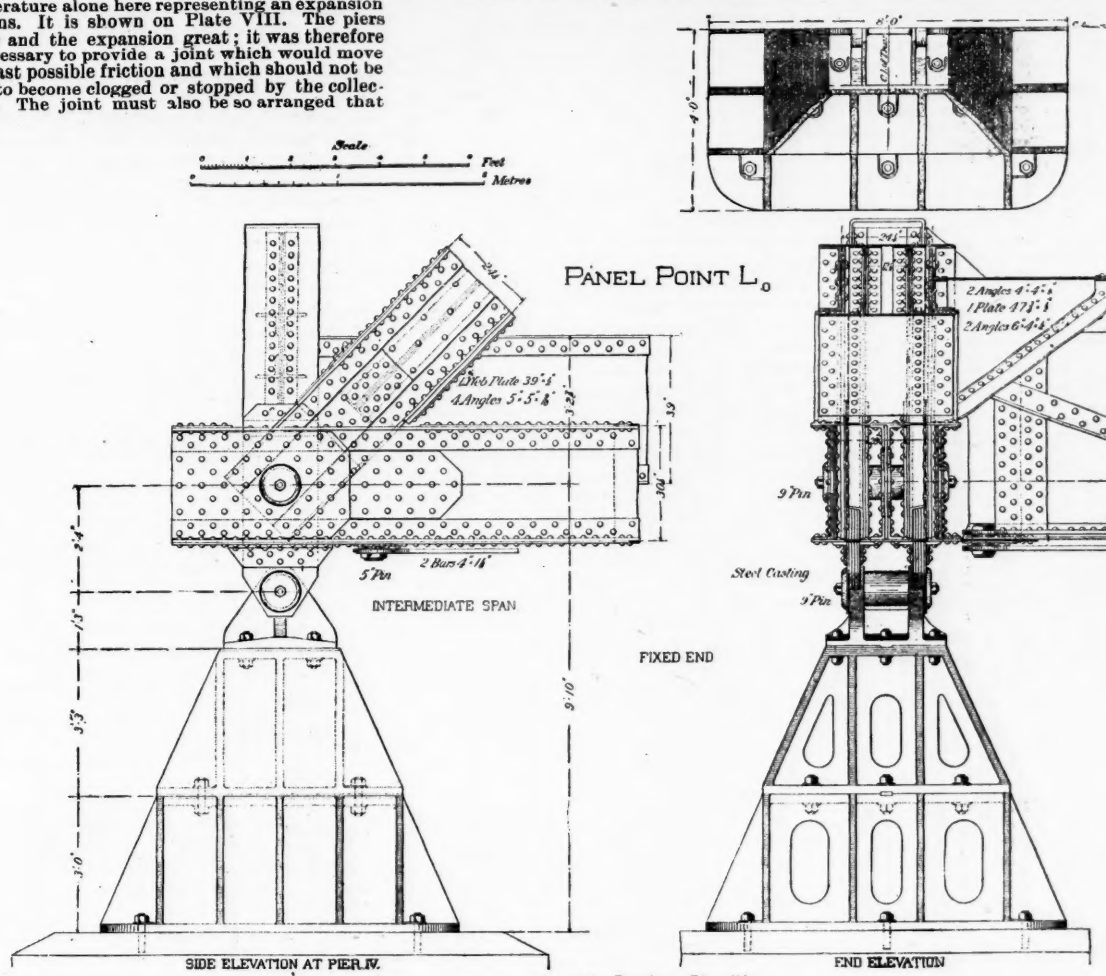


Plate 9—Bearing; Pier IV.

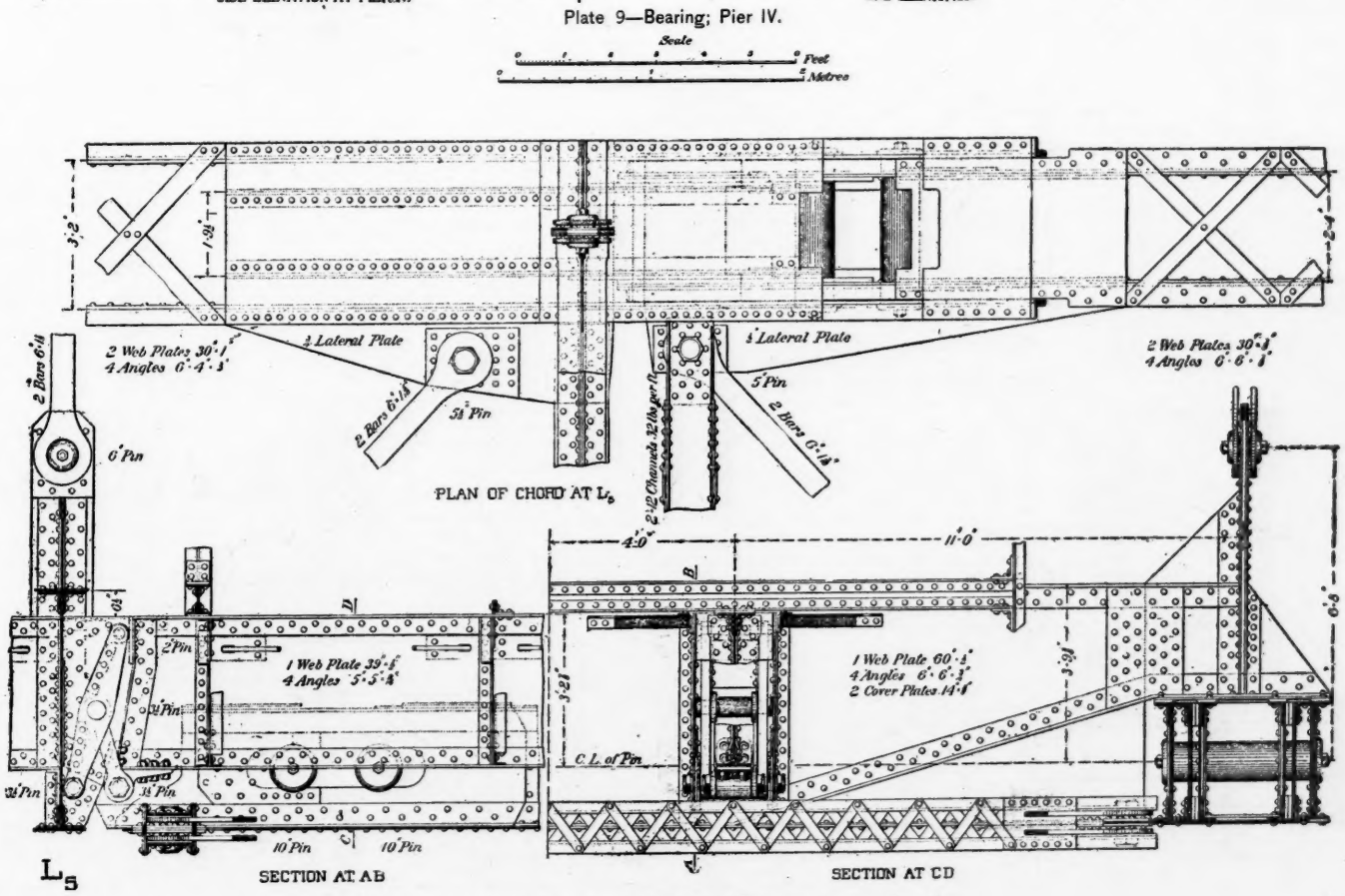


Plate 12—Expansion Joints; Lower Chord and Stringers, Intermediate Span.

MEMPHIS BRIDGE.

surface for the rollers to roll upon and provides adequate means for cleaning. The rail plates are in two parts, divided by the centre plate which guides the rollers.

The motion of the top bearing is further limited by a lock plate which is fitted over the lower guide plate, the upper jaws of which would strike the edges of the top bearing plate before a motion could occur which might cause the top plate to slide on the rollers.

Under the rail plates are the castings, which bear directly on the masonry and are like the lower sections of the fixed end castings.

The result of this arrangement is a very sensitive and very powerful expansion bearing. For convenience of observation it was fitted with vernier scales, and the record which has been kept of the motion so far indicates that this bearing works practically without friction.

A somewhat different form of support was used at the end of the intermediate span over Pier IV. This is shown on Plate IX. Here, also, the weight is distributed on the masonry by iron castings, and the weight is transferred to the iron castings through a pin on a steel casting; but the pin is placed below the level of the chord, the whole weight being transferred by a small upright support, which also holds the floor beam. While this works fairly well, it is not as satisfactory a detail as the other bearings. It was adopted with a view to keeping the construction of this particular panel point as nearly uniform as possible in the four places where it occurs, this supported upright taking the place of the suspended uprights at the other three points.

The expansion between the cantilevers and the suspended spans is taken up by sliding joints in the top and bottom chords, the long suspender swinging. No special addition was made to this suspender in consequence of this swinging motion, the extra strain which can possibly be produced in this way being less than that which is usually produced in horizontal eye-bars by their own weight. The sliding joint in the bottom chord is placed in the last panel of the cantilever. The sliding joint in the top chord is placed in the first panel of the suspended span. As the end web members of cantilever and suspended spans are parallel compression members, both of these sliding joints come where no strain exists.

The sliding joint in the bottom chord is shown on Plate XII. It slides between polished steel surfaces with a play of only $\frac{1}{32}$ in. This joint is placed near a floor beam, and the lateral system of the cantilever arm ends at this floor beam, which forms the lateral strut. The lateral system of the suspended span ends on the other side of the sliding joint, there being an independent strut to hold the two chords in position; this strut was put in after the erection of the superstructure, the pinholes being reamed in position. There is no observable lost motion at this joint. The top lateral strains are transferred at the ends of the suspended spans to the bottom chord by the portal bracing, and there is no lateral system in the top chord of the end panels of the suspended span. The sliding joint in the top chord is made; therefore, simply an oblong pinhole between two sets of stiffened tension members. The same oblong pinhole was used in the bottom chord joint, but principally for necessities of erection.

The large expansion existing at the ends of the suspended spans made some special expansion arrangement necessary in the connection between the stringers and the floor beams. An ingenious arrangement to accomplish this end was designed by Mr. Ralph Modjeski, Assistant Engineer, and is shown on Plate XII. It dispenses entirely with a long sliding surface, and supports the end of the stringer perfectly.

As the end of the anchorage arm consists only of tension members, it was difficult to make a satisfactory form of portal which would at once resist vibrations and have the substantial appearance which seemed important in the most conspicuous part of the bridge. The result was accomplished by making a stiff frame, entirely independent of the tension members, consisting of posts placed between the inclined eye-bars of the end panels, these posts being connected by a stiff strut at the centre, and the rectangular panel above divided by stiff diagonals. This stiff frame is attached to the pins of the truss, but the pinholes in the stiff posts are made 1 in. larger than the diameters of the pins, so that the tensile strains should not be disturbed.

A 10-Ton Locomotive Crane.

The engravings show a locomotive crane built by the Yale & Towne Manufacturing Co., which, while designed for a special purpose, is well adapted to railroad uses. This particular crane was built to handle large stones in the brownstone quarries of the Hall & Shaler Quarry Company, of Portland, Conn. It is used there for loading and unloading stones weighing from five to ten tons and distributing them along the track. It is also used as a wrecking crane. It is operated over about seven miles of tracks in and about the quarries and has walled a good portion of these tracks to a height of 10 or 12 ft. with massive blocks of stone. Heretofore these heavy blocks have been swung to a two-wheel ox-cart and drawn to a remote place in the yard by three or four yoke of oxen.

The general design of the crane is shown in the engraving. The truck or under carriage is of I-beams and plates riveted and bolted. Mounted on the truck is the rotating platform carrying the superstructure of the crane. This is pivoted to the truck by a hollow steel centre-pin and rests upon a circular turned path. On this path travel four steel rollers bearing the weight of the superstructure. The upright boiler is set well back to counterbalance the boom and load. The platform is of a box form and contains a tank for feed water. The operator stands between the boiler and engines, having in front of him as he faces the load the levers which control all the movements of the crane.

The boiler is of steel, of the vertical tubular type and of ample capacity to handle maximum loads repeatedly and continuously. It is supplied with the usual mountings and fittings. A convenient coalbox is provided on the platform, and there is a place for the necessary fire irons.

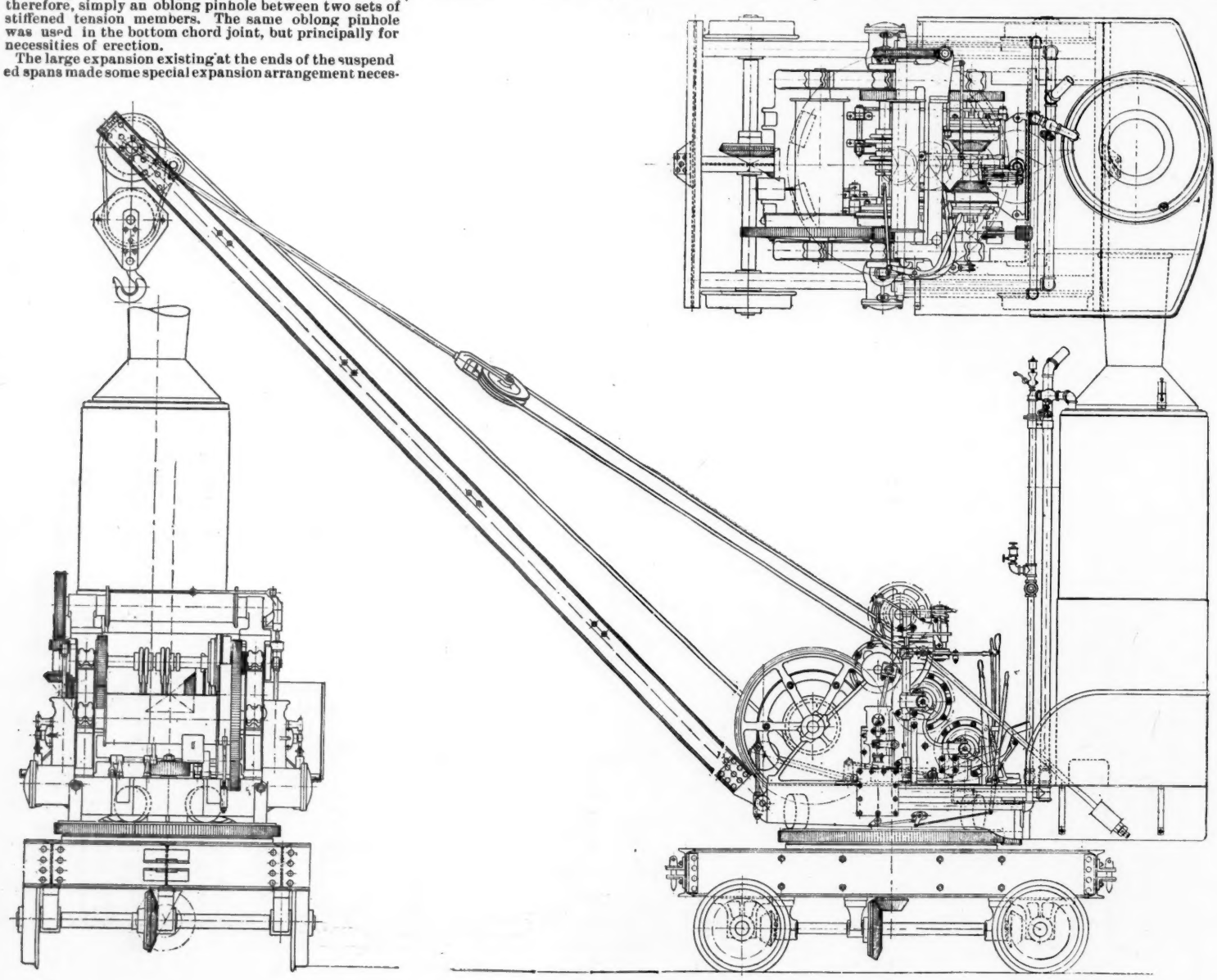
The engines consist of a pair of cylinders 9 in. diameter by 7 in. stroke, coupled at right angles. They are fitted with link-reversing gear, have wide ported slide valves and suitable oil cups and drip cocks. They are arranged to work under 100 lbs. pressure, and are coupled to the same crank shaft, and effect all motions of the crane.

There are three motions, a longitudinal travel on track, a rotary movement, and a hoisting and lowering movement, the latter under control of steam or by brake at will. These motions may be worked simultaneously or independently. The hoisting drum will take all the cable at one winding. It is driven directly from the main shaft by a train of cast steel gear wheels.

The rotating movement is one of the best features of the crane. It is accomplished by gearing a steel pinion into a large spur slip-ring. The slip-ring rests unbolted upon a smooth-turned plate or bed. It is fastened only by a hollow steel centre pin. The bed or plate is riveted to the I-beams of the truck frame. The object of this arrangement is to effect the rotary motion by the frictional resistance of the slip-ring on its bed, thus avoiding breakage to the gear teeth and undue strains on the frame which would result frem the sudden starting and stopping of the engine. This is a valuable feature of a rapid motion crane and is patented.

The traveling motion is transmitted through the hollow centre-pin by suitable clutches to a horizontal shaft which conveys it to both pairs of truck wheels. The tractive power is sufficient to propel the crane and its full load, together with one or two loaded cars, on an ordinary grade.

All the wearing surfaces are large and are provided with means for lubrication. The boom may be raised or lowered by suitable gearing and will give a sweep of 25 ft. radius when at its lowest working point. The whole structure when the boom is erect is barely 20 ft. in length, the truck frame is less than 12 ft. square, and the overhang of the platform about 2 ft. The truck frame extends out over the ends of the ties on either side and the space between the channels is filled with scrap iron, which acts as a counterpoise when lifting transversely to the track. There are also clamps by



TEN-TON LOCOMOTIVE CRANE.

Built by the YALE & TOWNE MANUFACTURING COMPANY, *Stamford, Conn., for the* SHALER & HALL QUARRY COMPANY, *Portland, Conn.*

which the truck may be fastened to the rails of the track. The top of the stack is 20 ft. above the rails. The crane weighs 28 tons when in operation and is designed to lift 10 tons.

A word about the quarries in which this machine is used may not be out of place. The quarry company owns and controls about seven miles of track running in and around about its yards and connecting with the Air Line Division of the New York, New Haven & Hartford Railroad at Portland, on the Connecticut River. The stone quarried from these quarries is the famous brown sandstone, of which so many buildings are constructed in New York. The quarries, when working full, employ about 1,000 men, operate five locomotives, and a large number of cars of various patterns. The quarrying is now done almost entirely by machinery. The drilling is done by large channeling machines, which cut channels 6 to 8 ft. apart, and of the width and depth that it is desired to take out stone. The stone is broken or split by the use of slow-burning dynamite. While a few years ago nearly all the stone was removed and transported by ox teams, it is now done by hoisting engines, locomotive cranes and railroad trains.

Quarrying was first begun at Portland in about 1665, and has been constantly carried on ever since. Some of the quarries have been excavated to a depth of 200 ft., and over an extent of many acres.

Ten-Wheel Passenger Locomotive—Delaware, Lackawanna & Western.

The engravings show the proportions and general appearance of a heavy ten-wheel passenger locomotive lately built by the Delaware, Lackawanna & Western Railroad Company and reported as giving excellent satisfaction in service.

The boiler, which is shown in detail in figs. 2 and 3, though somewhat resembling the Wootten boiler, differs essentially from it in having no combustion chamber with the usual brick wall at the end of the grate. This allows the use of longer tubes and increases the heating surface considerably. The crown sheet is rather flat for a boiler of this type, and the crown-staying consequently somewhat difficult. This construction, however, makes possible the use of a larger number of tubes. The back head is stayed by 1¼-in. braces riveted at one end to the sheet in the usual manner and pinned at the other to angle and T iron pieces which are securely riveted horizontally across the back head of the boiler. The side and crown stays are, respectively, 1 in. and 1⅛ in. in diameter.

The front sheet of the firebox is secured in the usual manner to the throat sheet by staybolts, and is flanged inward in such a manner that the tube sheet can be riveted to it. It will be noticed, however, that the flange projects 4 in. past the tube sheet and that six braces, fastened at the other end to the shell of the boiler, are pinned to the flange. This is an interesting construction, and one that is somewhat unusual, there being no occasion for it either in the Wootten boiler or the ordinary locomotive boiler in general use.

The space between the water bars of the grate is filled with small cast iron grate bars with $\frac{5}{16}$ in. openings, these being found suitable for burning anthracite buckwheat coal. In the two wide spaces between water bars, dump grates are placed. The long fire door opening is fitted with two doors, which on this style of boiler are found preferable to the two small doors generally used on separate openings. This design of boiler is not new, the Delaware, Lackawanna & Western having had similar boilers, but of a smaller size, in use on 19 × 24 in. engines for some time.

The engineers' cab is placed ahead of the firebox, as is common on locomotives of this style. Both injectors are on the engineer's side of the cab, one above the other, with the feed pipe from the upper one leading over the boiler just ahead of the dome to the left side of the boiler. Steam for the injectors is taken directly from the dome, the injector valve being placed near the dome, within reach of the engineer. The throttle valve is connected with its lever by a short rod running from the lever to a crank arm, shown at the side of the dome, and keyed to a shaft passing through the dome, from which shaft the valve receives its motion. Fig. 1 shows quite well the method of suspension, the position of the air pump, and other interesting features of this engine, together with a few of the principal dimensions. Below are given some of the dimensions not shown thereon :

Cylinder, diameter	20 in.
Length of stroke	24 in.
Size of steam ports	1⅛ × 17¼ "
Size of exhaust ports	3 × 17¼ "
Width of bridges	1⅛ "
Slide valve	Allen-Richardson, balanced
Maximum travel of valves	5¼ in.
Outside lap	⅞ "
Inside lap	Line and line
Inside diamater of boiler, front course	64 in.
Length of flues	12 ft. 6 "
Diameter of flues	2 "
Number of flues	288
Heating surface of flues	1,935 sq. ft.
Width of firebox	8 ft. 4 in.
Length of firebox	10 ft.
Grate area	83⅓ sq. ft.
Heating surface of firebox	147 "
Fuel	Fine anthracite coal
Total heating surface of boiler	2,082 sq. ft.
Weight of engines on drivers	110,000 lbs.
Weight on front truck	27,000 "
Total weight	137,000 "
Boiler pressure	160 "
Tank capacity, water	3,700 gals.
Tank capacity, coal	7 tons

The Berlin Electric Railroad.

The project of Siemens & Halske for an electric viaduct railroad designed to complete the Metropolitan system of Berlin has been approved by the Imperial Government and is about to bo put in process of execution. The existing Metropolitan road in 1882 carried 9.3 million passengers and has now reached an annual traffic of 33 millions, including the belt road. This service crowds the system so much that the headway of trains has been reduced to what is considered a minimum and the tracks destined originally for through traffic only are used for local traffic as well. The Siemens & Halske project is designed to furnish supplementary transverse lines north and south and east and west.

Although this is called a viaduct line as distinguished from the underground project of the General Electric Company, portions of it will be in tunnel where the conditions lend themselves to shallow tunnels, and other portions will be on the street level. The portion in tunnel will amount to about seven or eight per cent. of the whole. The present construction will be : (1) An east and west line from the Metropolitan station, just west of the Spree, to Charlottenburg, which will be entirely on viaduct ; (2) A line from the Friedrichstrasse station, in the heart of the city, southerly and then westerly to the Grünwald suburb. Of this, a short portion in the heart of the city from the Friedrichstrasse station to the Pottsdam station will be in tunnel. The portion from the Pottsdam station to the east and west line previously mentioned will be on viaduct; and the strictly suburban portion will be at the street level, but so designed as to be transformed into a viaduct line eventually; (3) A viaduct line from the Friedrichstrasse station northerly to Pankow, viaduct and surface.

The gauge will be the German standard, 4 ft. 8½ in., but the height of the cars has been reduced so that the normal clear height will be 3.15 meters, permitting the minimum depth for the tunnel and facilitating the passage from tunnel to viaduct. The cars will be mounted on two trucks, each of which will have an electric motor ; they will be 2.25 meters wide and the standard clearance of tunnels and structures will be 3 meters wide. It is estimated that the weight per wheel will be from 1.3 to 1.5 tons.

Stations will be reduced to the most simple possible form, having no waiting-rooms, but mere sheltered platforms three cars in length. At one end of the platform will be an entrance stairway where tickets will be sold, and at the other an exit stairway where the tickets will be taken up. The design for the viaduct will be very simple and economical ; the clear headway at the street crossings will be 4.4 meters, the depth of the roadbed from the top of the rail to the overhead clearance being 0.55 meters. It is proposed, however, to decorate the viaduct in accordance with the artistic demands of the capital. In the tunnel part, the clear width of which is 6.75 meters, the construction will be retaining walls with an inverted arch beneath and transverse beams above to carry the street pavement. The width required for the walls and clear spaces will be 9.25 meters, but by substituting an iron casing for the wall the extreme width may be reduced to 7.75 meters. The level of the bottom of the tunnel will be but a little below the normal water level, and it is expected that it will be easy to keep it dry with electric pumps.

Boilers at the World's Fair.

If one is to judge from the exhibition of steam generators at the World's Fair, the old type of boiler, with cylindrical shell and tubes, is no longer to be considered when the safest and most efficient plant is to be de-

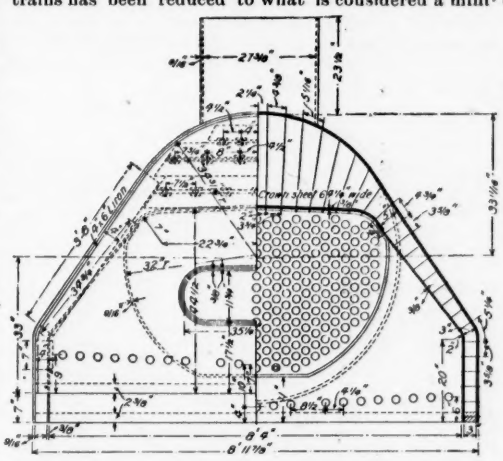


Fig. 2—Back End of Boiler, 10-Wheel Engine.

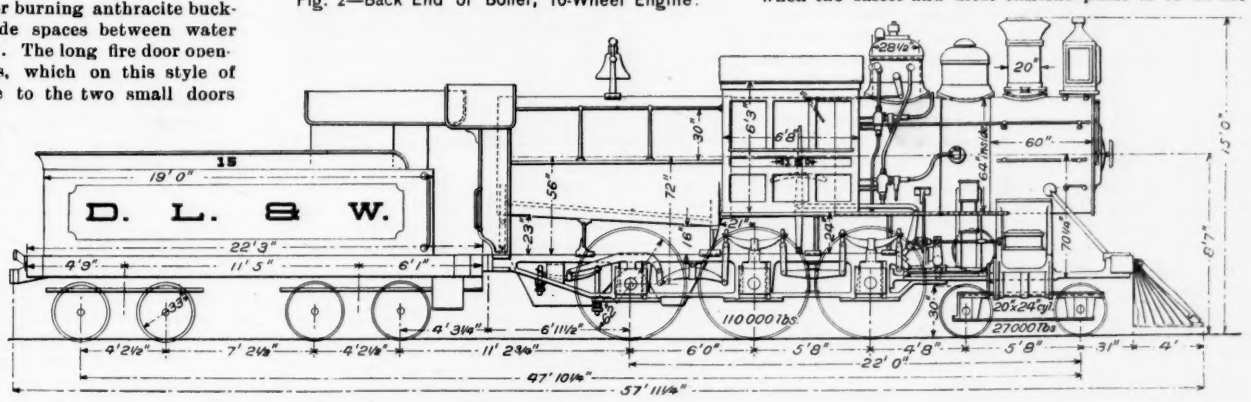


Fig. 1—Ten-Wheel Passenger Engine—Delaware, Lackawanna & Western.

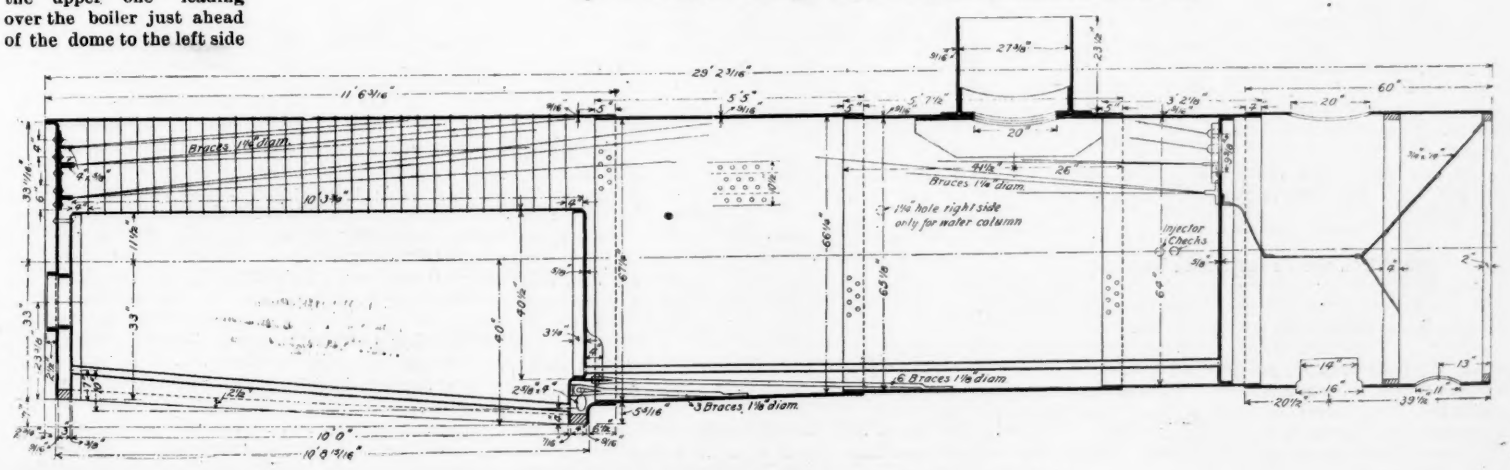


Fig. 3—Boiler—Delaware, Lackawanna & Western 10-Wheel Passenger Engine.

signed. The great majority of the boilers used to supply steam to the many engines and other machines in Machinery Hall are of the straight, water-tube type, with the tubes suitably connected at both ends, the tubes parallel to each other and inclined at an angle with the horizontal. Of the several similar types that were exhibited at the Centennial, only two, the Babcock & Wilcox and the Root, have space at the Columbian Exposition. There is much similarity in the general arrangement of all these tubular boilers, the water tubes being placed at about the same angle to the horizontal, and the deflecting plates arranged so as to direct the flames and hot gases of combustion across the tubes two or three times before reaching the flue leading to the stack. Below are tabulated the boilers of this description with the name and the number of each that is in use in the boiler room of Machinery Hall:

Babcock & Wilcox	Five batteries of three boilers each
Root	Four boilers
Campbell & Zell	Three batteries of four boilers One battery of two boilers One single boiler
National	Two batteries of six boilers
Heine	3,000 H. P. of boiler
Gill	Two batteries of six boilers

The principal points of difference between these boilers are the method of connecting the ends of the tubes, and the location and connections of the steam drum. The steam drum of the Babcock & Wilcox, the improved Root, the National and the Gill is placed horizontal, and has communication with both ends of the tubes; the Campbell & Zell and Heine have drums placed parallel with the tubes, the greater part containing water, and a steam dome extending across the boilers. The feedwater is generally introduced into a drum or pipe placed at the back and lower end of the tubes, and extending crosswise of them. In all but the Heine the "headers," into which the tubes are secured, either by expanding over, by threading or by bolts, are of cast iron with cast iron covers over the openings. These headers give communication between the tubes and the tubes and drum. In the Heine boiler, the water legs are of boiler plate, riveted together, and stayed as such flat surfaces must be. The tubes are expanded into the plate forming one side of the "header," and hand holes are provided opposite each tube to facilitate washing out. Two large drums extend parallel with the water tubes, and are supported by the water legs. A steam drum connects the two longitudinal drums.

Besides this type of boilers there are two batteries of eight boilers each of the Sterling type. It is a water tubular boiler with three groups of tubes placed more nearly vertical, but each group at a different angle. All the tubes are connected with the same drum at the bottom, but each group of tubes is connected with separate drums at the top. The two drums more directly over the grate are connected with horizontal tubes. The steam is taken from the middle drum.

In the boiler-room of the Intramural power station there are 3,000 H. P. of Babcock & Wilcox boilers, and the Heine boiler is represented by boilers rated at 1,500 H. P. in the annex to the main boiler-room, 750 H. P. at the Ferris wheel, and 1,500 H. P. at other places.

In the line of boilers in which the tubes are considerably bent are the Ward coil boiler, the Butman and the "Climax." The Ward coil boiler consists of a central cylinder, in which the feedwater is delivered, and a series of concentric semicircles of pipe expanded into both sides of vertical headers. The grate is circular. This is the type of boiler that was used in the "Monterey." The feature of it is that 1,300 sq. ft. of heating surface can be put on a floor space of 48 sq. ft. It is not in use at the Exposition, but is there as an exhibit. The Butman boiler is in use by the Wellington Catering Company, and is independent of the setting, which is also an exhibit, it being the Butman furnace. It is a vertical tubular boiler with submerged tubes. The hot gases pass first through the tubes to the chamber at the top of the boiler, from there to the passage around the shell, through which they descend to a passage connected with the chimney.

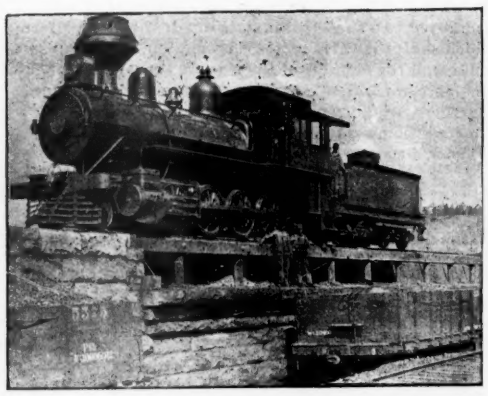
The Morrin "Climax" boiler is a sort of radial tubular boiler, with tubes radiating from a central cylinder into which both ends of the tubes are expanded, one end entering the cylindrical portion somewhat higher than the other. The feed enters at the lower end of the vertical cylinder. The feature of this boiler is that occupying a floor space 15½ ft. in diameter, and standing 37 ft. high, it has a heating surface of 10,000 sq. ft. These boilers, two of 500 H. P. and one of 1,000 H. P., are in the annex.

The fuel used in all these boilers is oil, which is pumped from the tanks in the southeast part of the grounds.

Ash Pit on the Pennsylvania Railroad.

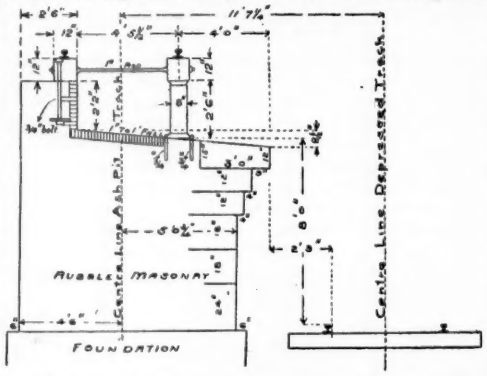
On the Tyrone Division of the Pennsylvania Railroad an ash pit was constructed last year at the East Tyrone yard of the Tyrone & Clearfield Railway, which differs materially from ordinary ash pits and which has given excellent satisfaction and materially reduced the cost of operation. The engravings show a dimensioned cross section and also the mode of operating the pit.

The ash pit is so located in the yard that it serves the triple purpose of ash pit, retaining wall and sea wall. The total inside length of the pit is 120 ft., so that two engines may clean their ash pans at the same time. With the exception of the three courses of coping, the pit is constructed throughout of rubble masonry carefully grouted. The floor of the pit and solid wall side are

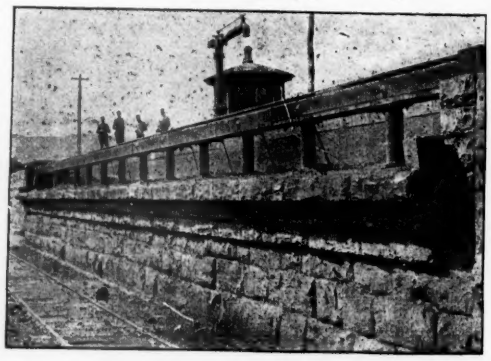


lined with hard red bricks set in cement, the bricks in the floor of the pit being set vertically on their long sides.

The 8-in. cast iron columns which support the 12 × 12 wooden girder rest upon recessed cast-iron plates



imbedded and bolted to the coping stone, and having on top of them recessed cast-iron caps with flanges on each side of them parallel to the length of the girder and keeping the same in line. The girders are covered with engine tank iron made to fit snugly. The girders under



each rail are tied together by 1-in. wrought iron tie-rods covered with cast iron sleeves which serve the purpose of keeping the girders at correct distance from each other and protect the iron tie-rods from action of heat and ashes.

Resistance of Cars on Curves.

(*Continued from page 658*).

We will now examine some of the conditions which can influence the resistances which were just defined.

In the first place, in seeking for those causes which may vary the coefficient of friction between the surface of contact, we find that every circumstance tending to reduce this coefficient tends to reduce the resistance first; then, by diminishing it, we have attached the resistant couple and consequently the horizontal pressures exercised by the wheels against the rails. Considerable diminution of resistance may thus be obtained, either naturally, when the rail is lubricated by a damp mist or by an artificial oiling of the flange. The pressure of the front wheel can be reduced by adding a third axle in the centre of the car, or by transferring a portion of the load to the back axle which lowers the frictional resistances, or the horizontal pressure can be reduced by giving a greater elevation to the outside rail. We have already seen that the minimum lateral action of the rails is obtained with such a super-elevation that the action of the weight equals the centrifugal force.

The wheel base of engines and cars has been found to act upon this resistance in two different ways. As it is increased, the arm of the lever is increased; also in most cases the obliquity of the front wheel is increased, and there is thus an additional tendency to increase the resistance. The wheel base of the cars, however, does not seem to have a very strong influence on this resistance; at least until it comes to very long wheel bases, when the effect of the obliquity tends to increase the resistance. If we reduce the base too much, the obliquity of the front wheel after passing a minimum tends to increase and that in proportion as the play on the track increases. The very short wheel bases are, therefore, unfavorable to resistance. Cars with bogie trucks, from the standpoint of direction and resistance on curves, seem to behave exactly like two separate cars with a somewhat short wheel base, and they do not show increments of resistance below that of other cars.

Another and more efficacious means of easing passage of cars on a curve and of diminishing resistance of friction and wear, consists in modifying the outline of the flanges of the front wheel. It might be possible, indeed, to find a form that would permit a very material reduction of the surface of contact.

At first sight, the simplest method would appear to be the increase of the conicity, but it is to be feared that an outline where the conicity was too great would give rise to disadvantages on a straight line or on a curve of a long radius. It is, therefore, preferable to maintain the standard outline over that portion which ordinarily carries the weight while rolling, and to increase the coning very much indeed on that portion which lies next to the flange, or even to connect this latter with the flat portion of the tread by a curve of somewhat large radius. The different outlines of this kind which were tried at Noisy, and gave excellent results from the standpoint of resistance and minimum wear, are shown in figs. 3, 4, 5 and 6 (See "Railroad Gazette," Sept. 1). The constancy of the results obtained with the same outline in spite of the variations of the conditions of the atmosphere, was very remarkable, especially when compared with the great variations given by other profiles on the same trip.

Everything that has been said regarding cars running over curves also applies to isolated engines without a tender running over a curved track without steam in consequence from some initial impulse. As a motor effort intervenes, the conditions evidently change; especially as this effort is exercised, as a whole, along the axis of the engine.

The consideration up to the present time has been regarding engines or cars running alone over curves; we now pass to cars running in trains.

It is very evident, according to what has been said, that every outside force tending to overcome the inclination of the cars to assume an oblique position, will diminish the horizontal pressure of the front axles against the outside rail, and that of the back axle against the inside rail. The Commission was only able to make tests of trains of cars having a standard tread, causing, on curves of a short radius, a somewhat accentuated, frictional resistance of the outside front wheel against the rail. It has been stated that the fastening of the couplings diminishes the increase of resistance on curves. The increase of resistance felt on the passage of curves by a train being hauled up a grade is, therefore, much less than that felt by the same train in descending a grade, and this circumstances tends from its nature to facilitate the traction over lines where the curves are of short radius.

1. In the opinion of the Commission it is possible to construct, under the favorable conditions, lines with a gauge of 4 ft. 11 in., and having curves of short radius dropping down to 500 ft. or lower under exceptional conditions, and that it is possible to operate these lines with the rolling stock used on French railroads. This applies especially to the freight engines with three and four pairs of wheels coupled. Also, that most of the passenger and freight cars employed upon the French roads would pass over such a line without any difficulty. This opinion is supported not only by the tests just dealt with, but also by information regarding the practices in France and abroad.

2. In the establishment of projected lines and the determination of the profile, it should be considered that the increase of resistance due to curves is about as follows:

On curves of 656 ft., 8.8 lbs. per ton.
On curves of 492 ft., radius 13.23 lbs. per ton.
The grades ought to be reduced in proportion.
These figures may be a little high and practice will probably tend to reduce them slightly.

The experiments to which we have alluded were made over curves of 328 ft. and 246 ft. radius. All kinds of rolling stock, engines, passenger and freight cars, were tried from the triple standpoint of curvature stability while running and resistance. The experimental track (fig. 1, "Railroad Gazette," Sept. 1) was formed of three arcs, each having a length of 262 ft., and connected with one another by two tangents. This track was connected by switches with the sidings at the station over which the experimental trains could be moved. As originally constructed, all of the curves were laid without any elevation of outer rail. This was done with a view of simplifying the dynamometrical measurements. Afterward the curves were given an outside elevation of 3.15 in. and later of 6.3 in. for the sake of comparison. The gauge of the track was originally widened ¾ in. on the central curve, and 1.18 in. on the two end curves. After the first experiments this was reduced to .04 in., and nothing on the extreme curves,

leaving the central curve unchanged. The rails, which had a length of 19.68 ft., were bent before laying.

PASSENGER AND FREIGHT CARS.

The purely geometrical examination of the problem demonstrates that with the usual arrangement of axles with new tires, a two-axle car with rigid wheel base passes freely over a curve of 328 ft. radius on condition that its wheel base does not exceed 46 ft., a figure very much higher than the maximum found in practice. We see, then, that no widening of the gauge is necessary on a curve of 328 ft., either for two-axle cars or for cars having bogie trucks. This conclusion also applies to three-axle cars of the Paris, Lyons & Mediterranean type, having a moderate side play to the centre axle.

On entering a curve the front axle of each car continues to carry the car in its original direction and comes against the outside rail, and then by virtue either of its own inertia or by that of the vehicle which it carries, or finally of the traction or push exercised by the remainder of the train, it tends to turn around the point of contact with the outside rail in a direction opposite to that which its radial position would require. The adjustment thus produced continues throughout the whole passage of the curve. If the connection between the axles is rigid, the second axle turns around the same centre and remains parallel to the first, thus attaching itself from the outside rail and coming closer to the inner rail; it thus tends to assume ara dial position. In this position contact against the inside rail sometimes occurs. In the case of bogie trucks, each of the two trucks adjusts itself independently under exactly the same conditions as an independent car.

It is therefore evident from a compilation of these observations, that the presence of the inside rail has no injurious effect. It tends, on the other hand, to limit a movement which is in discord with the natural direction of rotation. The widening of the gauge, therefore, is of little or no use. It is rather capable of producing an injurious effect from the standpoint of stability while running, or of the resistance or wear of the surfaces in contact. The different observations which precede were first made on a track without any outside elevation. By giving a portion of the experimental track an average outside elevation of 3.15 in., there was no change in the conditions of adjustment.

The stability against overturning is calculated as a function of the breadth of gauge, the radius of the curve, the height of the centre of gravity and the speeds. Under the most unfavorable conditions (a passenger car with seats on the roof), the overturning on a curve of 328 ft. radius on the normal gauge, and without any super-elevation, would take place at a speed of 46.6 miles per hour.

In fact, separate cars and entire trains have been pushed out on the experimental track, where there was was no outer elevation, at initial speeds of 37.28 miles per hour, without showing any tendency to overturn or even showing any special oscillation of the body on the springs.

From the standpoint of shocks, and the tendency to derailment, all observations made at these speeds, even to that ranging from 37 up to 41 miles per hour, have shown that the passage over curves of 328 ft. radius, as well as the passage from one curve to another in opposite direction or over a reverse curve, can be accomplished with very great smoothness. At the junction of the first curve with the reverse, when the track has considerable extra width of gauge, there was no shock, but an oscillation which was ample enough to produce a disagreeable feeling. The side swaying motions which often occur on straight lines disappeared completely.

For separate cars the method of observing resistances was invariably the following: The car or train experimented with was hauled some distance from the entrance to the experimental track. The engine was cut off and the train kicked at a given speed onto the track, where it was allowed to run over the straight line which preceded the curve, and then over the curve itself, and finally over the straight track again until it stopped.

During the run over the initial straight line the stylus

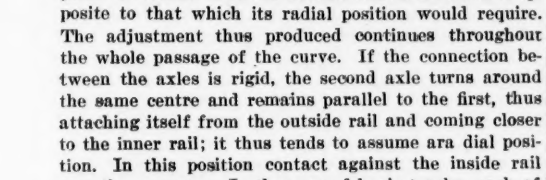


Fig. 7.

of the dynamometer traced the resistance line a b (fig. 7), which was practically a straight line. This line rose during the passage of the curve, while on the straight line that followed it resumed the prolongation of the original line of traction. Uniting a b and g h by a continuous line the resistance due to the curve at any point is given by the difference of the ordinates.

The elements which influence the resistance of the cars on curves are very numerous and depend on the construction of the track, the type of the rolling stock, the conditions of speed and composition of the trains. Smoothness of track exercises a considerable influence upon the facility with which the rolling stock passes over it. So as the condition of the track was improved by repeated repairs the average resistance dropped until it was below 17.64 lbs. per ton. The greater or less play existing in the track did not appear to have an appreciable influence upon the resistance measured; this influence, if it exists at all, seems to be unfavorable, inasmuch as it favored side motion.

The outer elevation of the track was also found to be without any sensible influence on the resistance. The effect of a very great outer elevation was not determined; but it does not seem that it would produce any great modification of results.

The entrance into a curve was observed under the usual conditions of operation; a shock more or less appreciable, according to the position which the front axle bears relatively to the outside rail at the moment of entering the curve, being felt. This shock was usually far less than that caused by passing over a switch point in good condition. As it is instantaneous, it is without any effect upon the resistance.

The passage over a reverse curve creates neither shock nor increase of resistance, provided the side play is sufficiently reduced. In the matters concerning the conditions of the construction of the rolling stock, there is very little difference between the several types. The average mean resistance due to a curve of 328 ft. radius on a good track is generally comprised between 17.64 lbs. and 13.23 lbs. per ton.

The wheel base, when it is between the limits of 8 ft. for short cars and 17.7 ft. for long passenger cars, has no appreciable influence. It may be admitted that the increase of wheel base is compensated for by the greater stability between the rails.

Freedom of adjustment of the axles seems to slightly decrease the resistance, but this action is capricious and in several consecutive experiments has shown some dissimilar results.

The long bogie cars do not differ in specific resistances from two-axle cars. Different experiments gave a coefficient of 17.64 lbs. to 18.74 lbs. This result should be attributed to the short wheel base of each of the two trucks which take the curves obliquely.

A slight defect in parallelism of the axles favors a passage over curves in one direction and increases the resistance on a curve running in the opposite direction. This effect is exaggerated if the car has been for a certain length of time in service by the excess of wear upon the flanges of the wheels on the side offering the greater resistance.

Tires newly turned, with the conicity decidedly pronounced, give less resistance than those whose flanges have been worn to an almost vertical face.

ENGINES AND TENDERS.

The geometrical examination of the problem shows that with the very long wheel base admitted in actual construction the freight engine with four axles, without any lateral play whatever, ought to pass over a curve of about 262½ ft. radius, without any widening of the gauge. A curve of 328 ft. radius will, therefore, always leave a certain amount of play even in the case of a rigid wheel base; this play is usually found to be increased by different arrangements of the boxes which allow it to adapt itself either with the front axle or with the two end axles.

Under these conditions the entrance on a curve produces essentially the same effects as on two-wheeled cars. The first axle always comes in contact with the outside rail around which it tends to rotate. The whole of the framework adjusts itself in consequence, but without ordinarily producing any contact between the back axle and the inside rail.

The tender acts like an isolated car bearing strongly with its front axle against the outside rail. This observation has been made both with the ordinary couplings and buffers, as well as with the oblique buffers of the Roy system.

The stability of all types of engines appears to be quite satisfactory in hteir passage over curves. The shock on entering is sometimes quite perceptible; but it does not exceed that which is usually felt in running over switch points. The speed of engine in the different tests was raised up to 31 miles per hour on entering and passing the curves.

The average results in resistance obtained, with but slight variations, were:

Passenger engines with two axles coupled, resistance 19.8 lbs. per ton.

Freight engines, three axles coupled, resistance 17.6 per ton.

Freight engines with four axles coupled, resistance 17.6 lbs. per ton.

It has been stated that the resistance decreases very especially when the front axle was lightened as far as was compatible with security.

TRAINS OF VARIABLE LENGTH.

Experiments were tried with trains of 10, 16 and 30 cars, the latter having a length of about 820 ft., extending almost the entire length of the curve, with three bends along its length. From the standpoint of location on the track it was seen that the cars, whether an engine was hauling them or they were moving by their own inertia, took the same position, relatively to the track, as separate cars. The inside rail is sometimes in contact with the back wheels, but without any appreciable pressure.

Regarding some observations made on a curve of 246 ft. radius at a speed of 25 miles per hour, it was found that:

1. All engines, passenger and freight cars used in current practice on the great French railroads run perfectly freely over a curve of 328 ft. and even 246 ft. radius on the standard gauge of 4 ft. 9 in., without any increase of width.

2. Increase of gauge offers no advantage. It may, perhaps, cause an instability and an increase of restance.

3. The interposition of a straight line between reverse curves is useful only from the standpoint of play at the buffers, and consequently may be limited to from 33 to 65 ft.

4. All outside elevation can be dispensed with without compromising the security of the passage over a curve even at relatively high speeds. Excessive outside elevation may be the cause of instability by favoring the displacement of the axles from the outside rail toward the inner rail.

5. The resistance of all kinds of cars, as well as engines of different types, on curves of 328 ft. radius averages about 17.6 lbs. per ton This figure may be down to 11 lbs. or 13 lbs. per ton, without having recourse to any arrangements which alter the simplicity of the construction of the rolling stock or militate against its employment in the regular way. On curves of 246 ft. radius, the average resistance does not exceed 22 lbs. per ton.

The experiments as a whole seemed to show that the influence of increasing the wheel base or increasing the distance between the end axles is of no particular importance; in fact, some tests made with passenger cars whose respective wheel bases were 11.5 ft., 16.4 ft. and 19.4 ft gave absolute values of increase of resistance which are very nearly the same.

The general opinion at first prevailed that the resistance per unit of weight which a train offers on a curve increases with its length, and that the use of long trains on lines with curves of short radius constitutes a very serious difficulty.

In experiments where the testing train was composed of 27 cars and measured more than 656 ft. in length, no abnormal increase of resistance occurred. In another test, where it was not possible to take any measurement, the train of 40 cars was hauled without any difficulty over a curve of 328 ft. radius.

The experiments made with passenger cars and isolated freight cars were repeated with trains and showed little difference whether the cars were running by momentum or were pulled. It was also found that for the moderate speeds which have been obtainable in these experiments, the increase of resistance on a curve is only slightly dependent on the speed. This conclusion is brought out quite clearly in experiments on a track without any outside elevation, and is limited to this special case.

Comparative experiments were made with a train of three flat cars with two axles, each carrying a load of five tons of wheels and axles which were alternately loaded in such a way as to place their weight on the rear axle of the car alone, upon both together, or upon the front axle alone. The values found for the increase of resistance vary, but little, but the direction of this difference was placed, beyond any doubt, by a test consisting of pushing with the same impulse two cars not coupled together, and where the load was carried in one upon the front axle, and on the other upon the rear axle. In reality it must be admitted that the increase of resistance was much less when the load was upon the rear axle. This fact was furthermore somewhat confirmed and verified in the course of the experiments, since a brake van gives always a greater increase when the van portion is in front; the same was also shown by experiments made with a view of determining the influence of the number of axles.

INFLUENCE OF THE OUTLINE OF THE TIRES.

The experiments on the subject of the influence of tires turned to different outlines with tires of the standard outline led to these conclusions: First, that straight treads gave the same results as when they were coned 1-20; on the other hand, by increasing the coning to 1-10, matters were improved.

The most interesting portion of these experiments is that which relates to the tires in which the connection between the body of the tread and the flange was obtained, not by a circular connection, but by a flaring conical surface.

Several direct comparisons have been made on a track without any outside elevation, to determine what improvement the oiling of the flanges would give from the standpoint of passage of curves. They have furnished the following results:

Numbers of experiments.	Description of engines.	Method of testing.	Proportional diminution of the increase of resistance on curves of		
			656.18 ft.	492.13 ft.	328.09 ft.
36-37	4 coupled axles P. O. I 182	Pushed together.....	17 p. c.	25 p. c.	27 p. c.
121-122	.....	Hauled by means of a dynamometer car.....	23 p. c.	29 p. c.	28 p. c.
119-120	4 axles of which 3 are coupled	....	doubt	25 p. c.	27 p. c.

The effect artificially obtained by oiling is naturally produced by some atmospheric conditions.

One of the chief questions presented to the Commission at the beginning of its work was: "In what proportion is it possible to modify the up-grades of a track so that where there is a curve of short radius a greater resistance will not be encountered than on a straight track?" Since atmospheric conditions can from day to day cause the resistance on curves within limited areas to change very considerably, it is useless to attempt to give an exact reply to the query, so that minor elements of increase may be neglected.

The Duty of a Railroad Company to Its Employees.*

BY S. R. BARR, *Superintendent of the Relief Department of the Baltimore & Ohio.*

In considering the matter of protection of railway employees the first inquiry naturally presents itself is, What are the specific dangers to which they are exposed and to what degree and how can they be overcome? It may be safely assumed that the reports of the Interstate Commerce Commission are correct in stating that there are, approximately, 700,000 railroad employees in the United States. In attempting to ascertain, definitely, the whole number of employees killed and injured we are confronted with the fact that most roads do not keep an accurate record. About the only record they have is the personal injury reports on file. Fortunately, however, for the purpose of this article, a record has been kept and published for some years past by at least five of the great lines, from which we learn the average number killed and injured on those lines, and it is fair to assume that their casualties are no greater than those of other lines. From this source it is found that, taking all classes of labor employed on the railroads of the United States, the number injured will average 240 per thousand, or about 168,000 per annum. This is an enormous number and suggests the operations of a large army in an active campaign rather than that of an every-day commercial enterprise.

The companies who keep exact statistics of these injuries and their causes are few but important, comprising the Pennsylvania, the Pennsylvania Company west of Pittsburgh, the Chicago, Burlington & Quincy, the Philadelphia & Reading and the Baltimore & Ohio. It is to be deplored that the number of such companies is so limited as it is only by such records that the managements of the companies can be made to understand and appreciate the enormous responsibility resting upon them and the necessity for making every possible provision for the prevention of accidents and for the care of those who suffer therefrom.

The record kept by one of the companies referred to shows the following causes of accident and the percentage of deaths and disablements arising therefrom:

	Death. Per-centage.	Injury. Per-centage.
Putting on or off brakes	2.2	1.3
Coupling cars	11.9	13.9
Caught between cars	3.3	1.4
Run over by cars	16.7	.8
Struck by cars in motion	10.5	.9
Fall (on duty)	1.7	9.8
Struck by foreign bodies	.5	4.9
Fire, steam, etc	.0	2.8
The shifting of freight	.0	.2
Handling freight or baggage	.3	1.9
Lifting	1.2	3.0
Caught by machinery	.3	2.7
Caught by miscellaneous	.3	6.1
Mis-step	.0	1.7
Struck by overhead bridge	5.4	.5
Struck by reverse lever of engine	.0	.4
Throwing of switch	.3	.8
Falling from train	18.8	7.3
Getting on or off train	2.7	5.4
Handling tools or materials	.6	31.9
Struck by water plug, signal post, telegraph pole, etc	1.8	.5
Wreck or collision	21.0	3.0

From this table it will be observed that 36 2 per cent. of the deaths are attributable to the use of link and pin couplers and hand brakes; 21 per cent. to wrecks and collisions; 16.7 per cent. to being run over by cars; 10.5 per cent. to being struck by cars, a total of 84.4 per cent.

The only other prominent cause is that of overhead bridges, amounting to 5.4 per cent., or 89.8 per cent. in all. The principal causes of injury are coupling and the use of hand brakes, 23.9 per cent.; handling of tools and materials, 31.9 per cent.; fall on duty, 9.8 per cent; caught by miscellaneous, 6.1 per cent.; getting on or off train, 5.4 per cent.; struck by foreign bodies, 4.9 per cent., a total of 82 per cent. This gives us definitely the specific dangers and their degrees. It is well known that a very large per cent. of accidents are caused by the personal neglect of employees, arising from familiarity with the dangers attaching to their occupations. There are other causes of accident for which the employees are personally responsible and which the companies can only partially guard against. The principal ones are the immoderate use of liquor by those engaged in hazardous pursuits, the misuse of time which should be devoted to rest and the consequent unfitness for duty when their turn comes; discontent and lack of interest and consequent inattention at times when all their faculties should be most alert.

Having admitted that protection is needed, let us see what is being done or what can be done in that direction. In the first place, it must be clearly borne in mind that the business interests of the companies demand that as few accidents as possible shall occur, for the very potent reason that they mean loss to the company both directly and indirectly, in that they have to pay damages to persons and for goods destroyed, for replacing rolling stock, track, etc., and that passengers and shippers very naturally avoid patronizing a road having an unusual number of accidents. This is the principal motive actuating directors and stockholders, who do not personally see the results of accidents, in providing men, measures and means for their prevention. It is to the honor and credit of the operating officials that humanity largely actuates them in recommending the introduction of every possible safety device. It is well known that the railroads expend an immense amount annually in providing measures of safety . . . The recent act of Congress requiring the substitution, within a certain period, of air-brakes and automatic couplers for the link and pin coupler and hand brake will remove the most prominent cause of injury to trainmen, although it is to be expected that these men will be more exposed during the transition period. To what extent the item of wrecks and collisions will be modified can only be ascertained by future experience. . . .

It being apparent that although the companies recognize their obligations in this respect and endeavor to meet them to the best of their ability, accidents will still happen, some systematic method must be devised for the care of these people; in alleviating their suffering; providing for them during disability; and securing a living, upon recovery, for those crippled that they cannot resume their former occupations.

In the published rules the location of comfortable stretchers and emergency cases containing surgical supplies is given. On some roads these stretchers and emergency cases are placed on every train.

During the time of such disability the employee is paid a per diem allowance equaling one-half pay for six months, after which his allowance is reduced one-half, but continues during disability, although it may last the remainder of his life, and at his death his family will receive the death allowance, ranging from $250 to $1,250, without the payment by the disabled person to the fund from which this allowance is made of one cent during his disability.

All of you connected with railroads know of cases of total disability, such as the loss of both eyes, both legs, both arms and other injuries forever preventing the employee from earning a living in any capacity. The arrangement known as the Relief Department fully provides for this class of cases, usually so troublesome and expensive to railway companies.

When the employee is able to go about, if he has lost a limb, crutches are provided and the money is advanced without interest for the purchase of an artificial limb of the best manufacture at the lowest prices and upon such terms of repayment as the employee is entirely able to make. In cases of special hardship these limbs are provided entirely at the expense of the company. When the man is able to work, although not at his ordinary occupation, a place is provided where he can at least earn a living and usually as much money as at any other occupation he is qualified for.

Mr. Barr then gave a detailed description of the relief departments of the roads above named, telling how they provide surgical attendance for all accidental injuries whether the road is liable for damages or not.* He continues: There is another class of employees who are entitled to consideration; those who, escaping accidental injury of a disabling nature, find themselves without means of support, whenever through old age or infirmity they become unable to perform the services required of them or to earn a livelihood in other pursuits. This class is provided for by at least one company. [The Baltimore & Ohio.] One other company [the Pennsylvania] has already accumulated a large sum to be eventually devoted to this purpose. It seems almost farcical to present any argument in support of the wisdom of such a plan, but I cannot refrain from quoting the celebrated Dr. Farr, of England, who boils it down to this: "Superannuation is a guarantee of fidelity; it encourages efficient officers; it retains good men in the service; it induces men to retire when they become old or inefficient from any cause and it prevents old employees from falling into disgraceful dependence or distressing destitution, which would be a public scandal and deter desirable persons from entering the service."

Further efforts in the direction of protection and improvement are or should be made by the companies in the more careful selection of those entering the service, having in view not only the applicant's ability to fill the subordinate place he immediately seeks, but his capacity for the higher ones he may be expected to reach either by promotion or emergency. In selecting a brakeman, the train master should take into consideration the probability and expectation of the man becoming a conductor, train master or even a higher position, and judge him accordingly. In some companies the applicant is subjected to a rigid physical examination, not only as to his present health and prospect for longevity, but his actual physical fitness for the place he seeks. He is further examined (required by law in some states) to determine whether or not he is defective in sight, hearing or color sense. . . . Further protection is afforded by the refusal of the companies to employ men who are known to indulge immoderately in intoxicants. Indeed, it may be said that they are beginning to be shy of those indulging even moderately, or suspected of doing so. Persistence in this direction will eliminate one of the most prolific causes of accident, to say nothing of the moral effect on the men and the communities in which they live.

We are further asked to consider what can be done for the improvement of these people. This is of such importance that it is entitled to the most careful consideration. The experience of the last 13 years forces the belief that this is best accomplished by the establishment upon the lines of each great company, and upon the smaller ones by consolidation, of a special department. That such a department can be maintained at an actual saving to the company is capable of demonstration by companies already operating in this direction. It will be found that such a department becomes the recipient of many valuable suggestions from all sources, and by judicious selection can actually protect and materially improve the condition of the employees by the expenditure of less money than the companies are now paying for injuries to persons, wages to injured persons, providing places for old employees unable to earn their wages, legal expenses, etc. It can establish better relations with employees; do more in a systematic manner for a larger number and materially improve the service in procuring and retaining better men. To such a department should be added what is now done by only two roads, namely, a savings bank for employees. This can be conducted with few details and as simply as possible, each agent of the company becoming a depositary, the company holding the money strictly as a fund and guaranteeing the safety of all deposits and a low rate of interest. The fund so accumulated can be safely loaned to other employees at a legal rate of interest for the purpose of securing homes for themselves on the lines of the company. This is not an experiment. It has been in operation on one of the trunk lines for many years without the loss of a dollar to either the company or the depositor and has been the medium through which hundreds of employees have acquired homes, who could never have done so otherwise. The profits of the money so invested are credited to the depositors (who are the only stockholders), thus materially benefiting both classes. This feature has done more than it promised, in that it has not only paid to its depositors more interest than was guaranteed, but more than is paid by most conservative savings banks.

The advantages of an institution of this kind are manifold. It convinces the employee that the company has some interest in his welfare, and by adding its contribution to his, with other valuable considerations, places him in a more independent position when compelled to lose time by reason of sickness and injury, preventing the loss of self-respect and any sense of humiliation as the recipient of the charity of his comrades, no matter how freely bestowed, and enables him to resume his occupation without the handicap of serious debt or obligation and its consequent discontent. It affords him the opportunity of safely investing small savings, and acquiring a home of his own on the most advantageous terms. That the railroad company profits by this goes without saying. If it did not secure indemnity against damage suits it might still be fully compensated by attaching its employees to its service by a community of interest at little cost.

It is to be regretted that the tendency of the managers of labor organizations is to give the employee the impression that the company is invariably antagonistic to his interests; but as he has absorbed this idea, the only remedy is for the company to put forth such practical efforts as will tend eventually to convince him that his employer has more interest in his welfare than he has hitherto had credit for. This persistence in kindly acts, not subversive of good discipline, will finally have its weight and will either result in a change of tactics on the part of the employee's counselors or in his turning from them in distrust.

One of the members of your Committee, Mr. M. M. Kirkman, struck a keynote when he said in his work on the maintenance of railways: "No one who is dependent on the goodwill and fidelity of others for the maintenance of his interest can afford to shun their acquaintance, or to permit them to remain in ignorance of his good intentions toward them. On the contrary, his duty and interest alike demand that he should cultivate such relations with them as may be necessary to assure them of his constant and kindly regard, and the beneficence of his purpose. . . ."

Dr. W. T. Barnard, in his admirable article on "The Relations of Railway Managers and Their Employees," says: "One result of the indifference of railway managers toward their subordinates has been to array against them agencies most potent in fermenting discontent—secret societies, brotherhoods and similar organizations; for it is a notorious fact that these organizations owe their success mainly to the assistance and relief they hold out to members and their families in case of sickness, disablement and death. . . ."

Subordinate officials should be divested of the power to discharge any employee for fault. They should have authority to suspend from duty and pay until all the facts can be submitted to a board of inquiry. . . . The doctrine of profit-sharing, so strongly advocated by persons interested in political economy and social science, could hardly be applied on the railroads. Examination of the earnings and expenses of the principal companies will convince any one that the employees are receiving more money under the present schedule of wages than if they shared all the profits with the stockholders. Efforts are being made by some of the companies to lessen the temptations of their servants by providing reading-rooms, etc., but much more must be done. Entertainments entirely of a religious character fail to attract. Those who have homes could be largely kept there if they could have suitable reading matter, without expense, to take home for the use of themselves and families. A free circulating library of over 10,000 volumes has been in use on one of the trunk lines for the past ten years, and the books are sent to the employees, wherever located, by train mail, without cost to them and without requiring any security. The circulation of these has been most extraordinary and there has been no abuse of the privilege. This library was created by subscription made by the officers and directors, and the operating expenses are paid by the company. The unmarried must have something more attractive than reading. The reading-rooms should occasionally be used for other purposes, such as recitations, dramatic entertainments, concerts, dances, and lectures on subjects likely to interest and benefit this class, and to all of which the "lasses" could be invited. These rooms should be regularly visited, unofficially, by the most prominent officers, and better impressions of both officers and men would be gained and no dignity lost by such intercourse. . . . It is not expected that the millennium will be advanced by efforts to protect the lives and limbs of these people and to improve their condition, but it may certainly be assumed that the business interests of the corporations will be benefited.

* Railway Employees: What Should Be Done for Their Protection and Improvement. A paper read before the World's Railway Commerce Congress at Chicago, June 23, 1893.

[*And apparently without regard to whether he is a member of the relief department or not. Possibly this statement refers to a road on which such membership is practically compulsory.—EDITOR.]

Train Accidents in the United States in July.

COLLISIONS.

REAR.

1st, on Detroit, Lansing & Northern, at Howell, Mich., a freight train ran into some cars which had been left standing on the main track, wrecking the engine and 7 cars. A brakeman was fatally injured.

2d, on Lake Shore & Michigan Southern, near Elkhart, Ind., a freight train ran into the rear of a preceding freight, badly damaging the engine and caboose. A brakeman was killed and the conductor injured.

6th, on New York, Lake Erie & Western, at Sloatsburg, N. Y., an east-bound freight train broke apart in two places and a collision resulted, derailing 3 cars. One brakeman was injured.

8th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Port Washington, O., a freight train which had been delayed in pulling into a side track was run into the rear by a following freight, and 15 cars were badly damaged. An engineer, a brakeman and a tramp were injured, the former fatally.

11th, on Boston & Maine, at Rollinsford, N. H., a freight train ran into a freight car standing on the main track, making a bad wreck. The engineer and fireman were injured, the latter fatally.

13th, on Pittsburgh, Cincinnati, Chicago & St. Louis, at Henryville, Ind., a freight train ran into the rear of a preceding freight, making a bad wreck. A man in charge of horses was killed and 2 trainmen were fatally injured.

14th, on Norfolk & Western, at Ivor, Va., a passenger train ran into a freight train standing on the main track; a passenger who jumped off was injured.

14th, on Evansville & Terre Haute, at Vincennes, Ind., a passenger train ran into a caboose, injuring 5 passengers.

15th, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Jewett, O., a freight train ran into the rear of a preceding freight, wrecking the engine, caboose and 15 cars. The fireman was injured.

19th, 2 a. m., on Boston & Albany, near Ashland, Mass., an east-bound freight train ran into the rear of a preceding freight which had been stopped in consequence of the breakage of a coupling, and several cars were wrecked. The wreck fouled the west-bound track and was run into by a west-bound freight train. Four trainmen were injured.

22d, on Boston & Albany, at Springfield, Mass., a freight train descending a grade broke in two and the rear portion ran into the forward one, damaging several cars. A brakeman was killed.

24th, on Southern Pacific, near Houston, Tex., an engine which had run out from Houston yard with no person upon it ran into the rear of a freight train, making a bad wreck. The conductor and one brakeman were killed.

24th, on Cleveland, Cincinnati, Chicago & St. Louis, at Mound City, Ill., a freight train ran into the rear of a preceding freight, making a bad wreck, in which flames broke out, burning 13 freight cars, 2 new passenger cars and a baggage car.

25th, on Norfolk & Western, near Welch, W. Va., a passenger train which had stopped on a curve on account of some slight mishap to a truck, was run into at the rear by a freight train running at considerable speed, killing a passenger brakeman who was under a car and 4 tramps riding in the freight car next to the engine.

27th, on Lehigh Valley, near Graceville, Pa., collision between a freight train and an empty engine, wrecking both engines. One engineer was injured.

27th, on Lake Shore & Michigan Southern, near Harbor Creek, Pa., a freight train broke in two and the rear portion afterward ran into the forward one, making a considerable wreck. Four tramps were injured, two of them fatally.

28th, on New Jersey & New York, at Hillsdale, N. J., a passenger train ran over a misplaced switch and into some cars standing on the side track, doing considerable damage. One passenger was injured.

And 22 others on 20 roads, involving 3 passenger and 34 freight and other trains.

BUTTING.

1st, on Illinois Central, near Kankakee, Ill., butting collision of freight trains, making a bad wreck. Three trainmen were injured.

5th, on Illinois Central, at Forty-fifth street, Chicago, butting collision between a freight and a train of empty passenger cars, due to a misplaced switch. One trainman was injured.

7th, on Pennsylvania road, near Osceola, Pa., butting collision between a passenger train running backward, down hill, and a freight train ascending, with two engines at the front and three at the rear. The foremost car of the passenger train was crushed for half its length. Three passengers were injured. The passenger train had sent a flagman in advance, but it would appear that he was not far enough from the train.

8th, on Philadelphia & Erie, near Johnsonburg, Pa., butting collision of freight trains, wrecking 2 engines and 18 cars. Two trainmen were killed and 4 injured, one of them fatally. It is said that one of the trains ran past an appointed meeting place.

13th, on Wabash road, at Newport, Ill., butting collision between a freight train and an empty engine, the conductor of the latter being injured.

14th, on Burlington & Missouri River, at Sugar Lake, Mo., a passenger train ran over a misplaced switch and into the head of a freight train standing on the side track, wrecking both engines and several cars. The engineer and the fireman of the passenger train were injured.

15th, on Norfolk & Western, near Lurich, Va., butting collision of freight trains, wrecking both engines and many cars. A fireman and a brakeman were killed. One of the trains started out of a side track on the time of the other, the trainmen having been asleep. They took the word of the station operator that a train had gone by carrying no signals when, in fact, it was flagged for a second section.

16th, on St. Louis & San Francisco, at Lancaster, Ark., butting collision of freight trains, wrecking both engines and 8 cars. One engineer was killed and two brakemen were injured. One of the trains had disregarded a telegraphic order.

19th, on Mobile & Ohio, at Jonesboro, Ill., a car escaped control and ran down a grade and collided at high speed with a freight train, wrecking the engine and several cars. A brakeman was killed and the engineer and fireman injured.

20th, on Norfolk & Western, near Bluestone Junction, Va., a passenger train, running backward, collided with a construction train, wrecking the passenger car. The foreman of the construction train, 1 fireman and 1 passenger were injured. The engineer of the work train had overlooked a telegraphic order.

20th, on Chicago, Rock Island & Pacific, at Tiskilwa, Ill., a stock train ran over a misplaced switch and into the head of a freight train standing on the side track, making a bad wreck. The engineer and the fireman were killed.

21st, on Cincinnati, New Orleans & Texas Pacific, near Erlanger, Ky., butting collision between a freight train and a work train, damaging both engines and 8 cars; engineer and fireman slightly injured. An operator failed to deliver an order to one of the trains.

21st, on Georgia Southern & Florida, near Macon, Ga., butting collision between a freight train and an empty engine, injuring both engineers. The empty engine was running on the time of the freight.

26th, on Louisville & Nashville, near Pulaski, Tenn., 4 cars of logs broke loose from a freight train and ran down a grade into the head of a passenger train, badly damaging the engine and the first 4 cars of the latter. Three trainmen were injured.

26th, 9 p. m., on Texas Midland, near Scurry, Tex., butting collision between an empty engine and a work train, the former having been brought to a stop just before the collision occurred. Both engines were damaged. It is said that the President of the road was acting as engineer of the empty engine and that he was flagging himself to Garrick.

28th, on Lake Erie & Western, near Indianapolis, Ind., butting collision between a freight train and a Pennsylvania passenger train, wrecking both engines and 2 baggage cars. Three trainmen and 3 passengers were injured. The freight conductor "thought the passenger train had passed."

30th, on Lehigh Valley road, near Delano, Pa., butting collision between a passenger train and an empty engine running at considerable speed. Four trainmen were injured. It is said that the engineer of the empty engine "thought the passenger train was not due until 10 minutes later."

And 7 others on 5 roads, involving 4 passenger and 10 freight and other trains.

CROSSING AND MISCELLANEOUS.

3d, on Philadelphia, Reading & New England, at Maybrook, N. Y., a passenger train ran into a freight train, injuring 2 brakemen.

5th, on Illinois Central, at 44th street, Chicago, a passenger train ran into a freight, badly damaging the passenger engine and 4 cars; engineer and fireman injured.

9th, at Brenhan, Tex., a passenger train of the Houston & Texas Central was run into by an engine of the Atchison, Topeka & Santa Fe at the crossing of the two roads, injuring 2 employees.

9th, on Chesapeake & Ohio, at Newport, Ky., an excursion train carrying 600 passengers ran over a misplaced switch and into a freight train standing on the side track. One passenger was killed and 7 injured, one of them fatally.

11th, at Atlanta, Ill., a passenger train of the St. Louis, Vandalia & Terre Haute was run into by a freight of the Chicago & Alton, at the crossing of the two roads, overturning two passenger cars. The engine and 2 cars of the freight were badly damaged. One passenger was injured.

18th, 8 p. m., on Western New York & Pennsylvania, at East Aurora, N. Y., an excursion train ran over a misplaced switch and collided with an engine on the turntable track, making a bad wreck. The fireman and 7 passengers were injured. It is said that the excursion train was 10 minutes ahead of time.

18th, on Great Northern, at Wenatchee, Wash., a freight train collided with a boarding car which was on a side track, but did not clear the main line, killing 1 employee and injuring two others.

22d, on Toledo & Ohio Central, near Corning, O., a freight train ran into the side of a helping locomotive which had just been detached from the train and was backing into a side track. The detached engine was overturned and the other engine and several cars were wrecked. Three trainmen were injured.

25th, 1 a. m., on Old Colony, at Dodgeville, Mass., a mail train (with one passenger car at the rear), running at high speed, struck a freight car standing on the side track, but not clearing the main track, badly damaging the sides of several cars and injuring four mail agents, one fatally and two probably so. It is said that the freight car was placed the usual distance from the main track, but that the body of the car leaned toward the main track so that the corner of the roof came in contact with the boiler of the locomotive of the mail train. One brakeman and five passengers were injured.

25th, on Pennsylvania road, at Willow Grove, Pa., a freight train, switching on the main track, was run into by a passenger train, badly damaging the passenger engine and several freight cars. Two trainmen and 3 passengers were injured.

28th, on Pittsburgh, Fort Wayne & Chicago, at Wanatah, Ind., collision of freight trains, fatally injuring a fireman.

And 15 others on 12 roads, involving 3 passenger and 24 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

6th, on Chicago, Rock Island & Pacific, near Peoria, Ill., a freight train was derailed, by spreading of rails, and 8 cars wrecked. A brakeman was fatally injured.

6th, on Cleveland, Cincinnati, Chicago & St. Louis, at Fairland, Ind., a passenger train was derailed at a defective switch and one car was partially overturned. Several passengers were injured.

19th, on Cleveland, Akron & Columbus, at Trinway, O., a passenger train was derailed and the cars fell down a bank. The baggageman was badly injured, but the passengers escaped with very slight injuries. It is said that the rails spread.

21st, on Burlington & Missouri River, near Arapahoe, Neb., several cars in a freight train were derailed, by spreading of rails, and 12 cars were ditched. Three tramps were badly injured.

25th, on Lake Erie & Western, at Peru, Ind., a freight train was derailed at a defective switch, and the engine and several cars ran some distance on the bridge over the Wabash River, but were kept on the floor by the guard timbers.

27th, 4 a. m., on Union Pacific, at Bessemer Junction, Col., a freight train broke through a bridge which had been weakened by a flood, and the engine and 21 cars went down. The engineer was killed, fireman and brakeman injured.

And 6 others on 6 roads, involving 2 passenger and 4 freight and other trains.

DEFECTS OF EQUIPMENT.

4th, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Wellsburg, W. Va., a passenger train was derailed by the breaking of a flange, and the fireman killed. Five passengers and two trainmen were injured.

5th, on Chicago & Alton, near Godfrey, Ill., a passenger train running at high speed was derailed by the breaking of a flange on the engine, making a considerable wreck. The engineer and fireman were injured.

12th, on Pennsylvania road, at Newark, N. J., a car in a passenger train was derailed by the breaking of an axle. Two passengers who jumped off were injured.

22d, on Pittsburgh, Fort Wayne & Chicago, near Lima, O., a freight train was derailed by the breaking of a flange and 15 cars were ditched. Two tramps were killed and 2 injured.

24th, on Philadelphia & Erie, at Ludlow, Pa., a freight train was derailed by a broken wheel, making a bad wreck. One brakeman was injured.

25th, on St. Louis, Chicago & St. Paul, near Riehl's, Ill., a freight train was derailed by a broken wheel and broke through a trestle bridge, and 18 cars were wrecked. The conductor was killed and a brakeman and 2 other men were injured.

And 19 others on 17 roads, involving 2 passenger and 17 freight and other trains.

NEGLIGENCE IN OPERATING.

1st, on St. Louis, Iron Mountain & Southern, at St. Louis, a switching freight train was derailed at a switch, making a bad wreck in which 1 brakeman was killed.

7th, on Cleveland & Pittsburgh, near Steubenville, O., a passenger train ran over a misplaced switch and the engine was derailed. The engineer and fireman were injured.

13th, 12:06 p. m., on West Shore road, at Newburgh, N. Y., a northbound passenger train ran over a misplaced switch and entered a side track at high speed, the whole train running off the track soon after passing the switch. The engine and cars struck a freight train standing in the yard, making a very bad wreck. Seven passengers were killed and 21 injured. The distant signal for this switch indicated "all-clear," the interlocking having been taken out a few hours before the accident to permit of repairs to the switch. The repairmen probably misplaced the switch after the switch-tender had set it right,

And 12 others on 10 roads, involving 3 passenger and 10 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

8th, on Chicago & Northwestern, at Wallace, Mich., a freight train was derailed by running over a cow, and 14 cars were ditched. The engineer was killed and the fireman injured.

15th, 4 a. m., on Pittsburgh & Western, near Undercliff, Pa., freight train No. 28 ran into a mass of stone which had fallen from the roof of a tunnel, wrecking the engine and 6 cars. Two trainmen were injured, one fatally.

21st, on Concord & Montreal, near West Thornton, N. H., a train consisting of an engine and 2 freight cars, the engine at the rear, was derailed by running over a hand car, and the cars fell down a bank. Two employees were injured.

22d, 9 p. m., on Rome, Watertown & Ogdensburg, at Watertown, N. Y., a passenger train was derailed at a misplaced switch and ran some distance on the sleepers, but no one was injured. The switch lamp had been extinguished and the engineman had therefore slackened speed. The misplacement of the switch is believed to have been malicious.

25th, on Ohio Valley road, near Morganfield, Ky., a freight train was derailed by running over a cow, and 6 cars ditched. The engineer, fireman and one brakeman were killed and their bodies burned.

27th, on Philadelphia & Reading, near Barry, Pa., the engine of a passenger train was derailed by a large stone which had been wedged in the flangeway at a crossing. It is said that the obstruction was the work of tramps.

30th, on Denver & Rio Grande, near Cotopaxi, Col., passenger train No. 4 was derailed by drifted sand and the engine was ditched. The engineer and one other man were killed and the fireman injured.

And 2 others on 2 roads, involving 1 passenger train and 1 freight train.

UNEXPLAINED.

1st, on Southern Pacific, at Delta, Cal., a car in a passenger train was derailed and partially overturned. The sleeping car porter jumped off and was killed.

1st, on Wheeling & Lake Erie, near Massillon, O., a freight train was derailed and a brakemen injured.

3d, on St. Louis & San Francisco, near Monett, Mo., the engine of a freight train was derailed and overturned, killing the engineer.

14th, on Toledo, Ann Arbor & North Michigan, at Ann Arbor, Mich., a passenger train was derailed and a boy stealing a ride was injured.

15th, on Southern Pacific, near Harwood, Tex., a dead engine in freight train No. 26 was derailed and the caboose was wrecked, causing the injury of the conductor and one brakeman, the latter fatally.

25th, 5 a. m., on Pittsburgh & Western, at Monroe Falls, O., a passenger train, running at considerable speed, was derailed at a curve and three cars well filled with passengers bound for the World's Fair fell down a bank. Twenty-one passengers were injured.

28th, on Ohio Valley road, near Hopkinsville, Ky., a freight train was derailed, making a bad wreck. Three tramps were killed.

And 20 others on 18 roads, involving 4 passenger and 16 freight and other trains.

OTHER ACCIDENTS.

3d, on New York Central & Hudson River, near Canandaigua, N. Y., a passenger train was shocked by a stroke of lightning and the conductor was rendered unconscious.

16th, on Northern Pacific, near Hoyt, Mont., a car of cattle in a freight train caught fire presumably from sparks from the locomotive, and the cattle had to be liberated. One of the men in charge was injured by one of the animals.

And 3 others on 3 roads, involving 1 passenger train and 2 freight trains.

A summary will be found in another column.

The Weather and the Railroads in India.

People who live on the plains of India can generally depend upon having fine weather from Nov. 1 to June 15, with the exception of three or four days, during December, when light rain may be expected. This year has proved an exception to the rule, and there has been rain at short intervals in most districts. In some parts there has been no hot weather worth mentioning, and although the wiseacres predicted that the rainy season would be later than usual, it actually commenced a fortnight earlier.

The average rainfall for the whole year at Calcutta is 64 in., but up to June 26, 48 in. had fallen (against 12 in. up to the same date last year), and it has been raining every day since. Several brick houses have collapsed, and the lower portions of Ballygunge and other suburbs are three or four feet under water. At Bombay all the low-lying ground is under water, and the record for heavy rain was broken on June 21, at Broach, where 8 in. fell in two hours. Traffic was suspended for some days on the Bhornager Gondal railroad owing to a heavy fall of rocks on the Ghaut section.

The Rajputana Malwa railroad has been breached in three places; there has been a fall of rock in one of the tunnels on the Southern Maharatta line; and the Darjeeling Himalayan railroad has had two bad slips, which necessitated transhipment of passengers and goods. Construction work has been greatly interfered with, especially bridge building, and the staff of the Assam-Bengal Railway, who could not make much progress owing to the scarcity of water a few months ago, are now wondering whether the deluge is ever going to stop. Rivers are in flood everywhere, and if the rain continues there will be breaks on most railroads before long.

It is splendid weather for rice and unless we have a long break in August, as the Meterological Department think likely, the crop will be a bumper one, but other crops will suffer, especially wheat.

The closing of the mints has caused exchange to rise and eased the financial pressure to a certain extent. It is expected that several projects for railway extension, which have been shelved for some time owing to the inability of the government to provide funds, will be put in hand during the next six months.

The famous temple of Juggernaut at Pooree, and the temples at Dëoghur (Baidynath), are now being visited by tens of thousands of devotees, and special trains of box cars are being filled with passengers, as the ordinary service cannot provide sufficient accommodation. This is a special year for pilgrimages, owing to there being two months of the same name, this being the way in which the Hindoos get over the leap year difficulty.

CALCUTTA, July 2, 1893. NUT LOCK.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday.
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The disaster on the Boston & Albany is the most startling and deplorable bridge failure that has occurred in this country since Ashtabula, excepting the Bussey bridge. Tariffville was on a poor road, and the Chatsworth disaster was due to a not uncommon cause. The Tay bridge and Mönchenstein were worse but were not in this country. The Boston & Albany is a conservative road, with a high reputation for safety. It has never before had a train accident, we believe, which caused the death of more than two or three passengers. As will be seen from our account of the accident the cause will, in all probability, be very easily discovered: the railroad company depended for safety upon the contractor, and the contractor appointed an ignorant foreman, with the expectation that the officers of the road would look after him. But as yet this conclusion is based on the testimony of amateurs only, and we must wait for further information before pretending to exactly place the responsibility. Fortunately this is a case in which the public can wait with patience, for the methods of the Massachusetts Railroad Commission are singularly thorough and intelligent, and we are justified in feeling great confidence that the exact facts will be made public through the investigations of that body.

The Pennsylvania is now operating 31 miles of its New York Division with automatic block signals, 19 miles from Jersey City to Perth Amboy Junction and 12 miles from Philadelphia to Holmesburg Junction. These signals are the Westinghouse electro-pneumatic, as was announced in these columns at the time the work of erecting them was begun. This installation is an event of importance as it indicates the faith of an important company in the principle of automatic block signals for a busy road. The New York Division is one of the busiest railroads in the United States. The Pennsylvania officers have always kept themselves well informed as to progress in all parts of the world, and as early as 1873 showed their appreciation of the lessons of experience on English railroads by beginning the use of the block system as it was used there; that is, with operators at each block station and with only the simplest electrical appliances. They have steadily extended the use of this system at great expense and have established it throughout their main lines. They have not spared expense in their efforts to attain a high degree of safety and it is therefore fair to presume that in replacing the English system with automatic signals, for the purpose (1) of making shorter block sections, and thus increasing the capacity of the road, and (2) of getting the advantage of the track circuit principle, they have not been unduly influenced by the probable saving in operating expenses. They have tested the automatic signals on their main line at Pittsburgh nine years, certainly a long enough time for a thorough test. It is also to be noted that the freight tracks of the New York Division are now placed under the block system for the first time. Although this division has been a four-track road, practically throughout its length for several years, the freight tracks have hitherto been operated for the most part independent of the block system, as they could not have been operated with it without a large addition to the force of signalmen. The report that the automatic signals will soon be erected throughout the main line is unfounded, but the company evidently intends to equip the whole of the line from New York to Philadelphia with these signals within a year or two.

Brick Lined or Water Lined Fireboxes.

At a recent meeting of the Verein für Eisenbahnkunde at Berlin, one writer advocated the substitution of a detached furnace firebox, wholly brick lined, in place of the ordinary water surrounded firebox of a locomotive boiler. The advocate of this scheme described an experiment made with a freight engine so equipped, and reported the results to be admirable. It is further claimed for this scheme that the repairs would be less than with the ordinary form of boiler. It was reported that the specific results of the tests made with the freight engine were a saving in fuel and an increase in steaming capacity.

The folly of all this was shown in the *Railroad Gazette*, Jan. 10, 1890. It is not a new scheme, but is, in fact, a very old one. It has been advocated by some mechanics here, and two or three locomotive boilers have been lined in the fireboxes with firebrick, with loss not only in efficiency, but in capacity. The reason for the losses is perfectly clear when the theory of the plan is understood.

Those who advocate brick-lined instead of water lined fireboxes do so with the belief that the cold surfaces of the water-lined firebox prevent the complete combustion of the gases, and that by using a firebrick lining the greater heat obtained in the firebox surfaces assists materially in consuming the gases, and a more complete combustion is expected. The fallacy of this lies in the fact that the high rate of coal consumption in a locomotive firebox prevents complete combustion under any circumstances except when the fires are very thin and the blast light, and then the combustion is nearly complete. With the firebrick lining the gases go to the tubes with practically all the heat of combustion. The point of smokemaking—which is the point where the gases are cooled so much that they will not combine with the oxygen—is not in the firebox, but in the tubes; and the place for a brick lining is theoretically in the tubes and not in the firebox. The tubes act on the firebox gases to stop combustion in the same general way that a safety lamp acts in a mine having explosive gases. The action of the small apertures on gases passing through them is to extinguish a flame, while the cooling effect of a flat plate, like that on the sides of the firebox, is exceedingly small and quite immaterial in locomotive work, where so much fuel is burned per square foot of heating surface.

Most of the steam generated in a locomotive boiler is made on the sheets of the firebox and on the surface of the first two or three feet of the length of the tubes; the remainder of the tube length acts principally as a feed water heater to raise the temperature of the water to the steaming point. Each square foot of firebox surface will evaporate as much water as 6 or 8 sq. ft. of tube heating surface, depending upon how much the fires are forced, and to cover up the heating surface of the firebox with firebrick is singularly illogical. If the advocates of such insulation were working upon a true theory, then one would expect to find Mr. Buchanan's firebox with a large additional firebox surface in the form of a water table making volumes of black smoke and working with low efficiency; but this is not the case, and the success of Mr. Buchanan's firebox is quite sufficient proof of the error in the theory of those who advocate brick lined fireboxes.

Probably nothing need be said about the incidental troubles in operation which would result from the use of such a mass of firebrick in the locomotive firebox. This was referred to in the article in the *Railroad Gazette* cited above. Even the small firebrick arch gives trouble enough in ordinary working where locomotive equipment is short, and one can imagine the utter impossibility of using a complete firebrick lining in a locomotive firebox in practical service.

Responsibility for the Long Island Collision.

The cause of the collision at Long Island City on Aug. 26 proves to have been the failure of the signalman, R. J. Knott, near Haberman's factory, to wait until the Manhattan train had passed his semaphore signal, before giving the signal "line clear" to the signalman in the rear, Bushwick Junction. The evidence to this effect by the last mentioned signalman is not contradicted, and it is stated that Knott made a confession to the coroner, though he was not put upon the witness stand at the *inquest*. The signaling was by bell code and there was no Morse telegraph connection with Knott's cabin. He had been there but a few weeks and had before that been flagman at a street crossing, which place he had to leave because the heat of the sun affected his head unfavorably. He is 23 years old, came from England not long ago, began work for the road at the crossing in June and received, as signalman, $40 a month. Some accounts say only $1.15 a day.

These facts constitute a serious indictment of the company. They justify the severest criticisms that have appeared in the daily newspapers and tend to justify all of them. If the rate of pay is as stated, that alone is presumptive evidence that the man is not up to the proper standard and that the officer who fixed the rate does not fully realize the importance of the position of signalman, for it is 10 to 30 per cent. below the rates paid by the best roads. The position of block signalman is one in which, within wide limits, the pay does not rightfully depend upon the amount of work. There is very slight warrant for reducing the pay below the standard on account of fewness of trains, because the real things for which a man is paid are his regular attendance, his vigilance and his knowledge of the gravity of the duties, which must be the same for 20 trains a day as for 200. This last item, knowledge, means his years of experience and familiarity with trains.

Experience is the keystone in the qualifications of a signalman. It may be admitted that the duties are simple. An American boy of 17 can readily learn them. No doubt many such boys do actually perform similar or equally important offices in the handling of trains. That, however, does not justify the employment of such boys or even of persons several years beyond 17. The success of very young persons in delicate work—handling telegraphic train orders, for instance—may be largely owing to favorable circumstances, what we call good luck. Even if it be shown that such a boy follows the requisite mental habit or routine, and makes no serious error for a series of years, that does not afford us any basis on which to select equally well equipped minds in other boys. For, be it remembered, when we appoint to such an important position a person without experience, we must warrant him perfect. In appointing a person of experience, his experience may take the place of or be the warrant for his theoretical qualifications. Cautious railroad officers admit their inability to unerringly select the best operators, signalman, etc., wholly by theory, at least where there are considerable numbers to appoint, and they therefore insist on some experience in the candidate.

The experience needful in a signalman is not wholly in signaling. Apprenticeship in a tower with an older man is not the only requisite preparation, perhaps not the chief one. Experience with trains, and, as some one has expressed it, age enough to be able to think, are essential. A clear-minded newsboy, who has worked on a train, or a lamp cleaner at a signal tower, would realize the possible dangers better even than a college graduate who had given his mind wholly to other matters. Seeing trains moved and thus getting some knowledge of their weight and possible momentum, hearing old trainmen or signalmen discuss their work and their difficulties, observing the results of blunders in lesser matters—all go to make up the mental habit which fits a person for the responsibilities we are speaking of. Even an American of 23 is none too far beyond the minimum limit of age for a signalman, but an Englishman who has been on the sea all his life (as Knott is said to have been) may be more unfit than a table-waiter or a dressmaker.

The need of simple strength of character, which comes only with age, is illustrated by one bit of the testimony in this case. The trains were quite frequent on the night of the collision, and the signalman at Bushwick Junction says that he signaled Knott three times asking for permission to send on another train. This repetition must have been within a short interval of time, and indicated impatience. This would be a distinct temptation, to a weak man, to stretch the rules, for he would be intelligent enough to know that he would be blamed and perhaps censured for causing unnecessary delay, but would not be courageous enough to resist importunity.

As far as this particular accident is concerned, the Railroad Commissioners will need to make little inquiry, for the facts that have already come out are sufficiently damaging and sufficiently explain the disaster; but it is due to the public that they investigate the whole practice of the road. The General Manager said that "all the employees were vouched for and apparently competent," but in view of the present disclosures people will want to know what kind of an officer it is that accepts such vouchers as Knott's must

have been, and how his standard of competency has affected the selection of men for the other towers on the road. The engineman of the Rockaway train had been discharged from the New York Central, and the signalman implicated in the Parkville disaster last June had been on the Erie; the presence in the force of many men who have been on larger roads suggests inquiry as to the methods of engaging men. The brakes used by the road need investigation. It comes out that the Rockaway train was fitted with a vacuum brake, an apparatus which for heavy and fast trains is behind the times.

The enginemen who testified at the inquest aroused considerable interest by their showing that the signal near Haberman's was in an unfavorable position being approached on a curve which turns to the left. This point may have a bearing on this collision, as it is said that the light was turned from white to red after the Manhattan train started and while the Rockaway train was still some distance off; in which case the allegation that the engineman had his eye directed so high that he overlooked the tail lights of the train would not afford him much of an excuse for not shutting off sooner. It appears that whatever fog existed that night was in the meadows below the level of the track. However this point may affect the present collision, people generally appreciated it because it was one that they could comprehend. But we would remind these enginemen that they will incriminate themselves if they are not careful. As long as they know that there is a signal to be looked for, and that it is dangerous to approach it at full speed unless they see it while yet a good distance short of it, should they not see it, at any cost, or else reduce speed? Do they mean to say that they are too busy or too lazy to get over to the fireman's side of the cab?

The verdict of the coroner's jury is not a strong one. It holds Knott criminally negligent, and he has been imprisoned to await trial; but it does not censure the road for employing such an untrained person, though there was evidence tending to show that discipline was loose, generally, at the towers. The jury does blame the company, however, on a doubtful point, to wit., for permitting flagmen to be called in too soon. In this case the conductor tried and expected to start his train promptly; he did not intend to wait for the flagman; so that there was at least an attempt to carry out a safe rule. If the flagman had put down torpedoes, his return would probably not have been censurable; but the standard rule requires the man to go back a certain distance (3,000 ft.) and there put down torpedoes; it does not tell him that if he goes half way, or one-third of the way, and returns, that he must place torpedoes at the farthest point he reaches. This is a weakness of the rule; but, as we have heretofore pointed out, the constant use of torpedoes where trains are very frequent is a safeguard which defeats itself.

Before dismissing this collision it will be well for American railroad officers to note the fact that the first criticism of some English experts would be on the absence of distant and starting signals. There is some reason in treating a distant signal as a convenience rather than a safety appliance, but the starting signal, which in a case like this would mean simply an additional home signal, placed further along, is treated as an important safeguard; that is, a signalman is instructed to authorize the admission of a second train to the preceding block only after the first one has passed both his home and starting signals. The Board of Trade, we believe, does not approve rules which fail to require this. While in America efforts to increase safety have been in other directions, it is fair to remember, when considering the good record of the English roads, that this rule has doubtless been a factor in producing it.

Joint Rates and the Long-and-Short-Haul Law.

The Interstate Commerce Commission has issued another report on the long-and-short-haul section of the Interstate Commerce law, a summary of which will be found in the traffic column. The complaint on which this decision is made was filed about 15 months ago and we do not remember to have heard of it before. It is somewhat peculiar, in that the list of defendants includes railroads as widely separated as the Alabama Midland, the Missouri Pacific, the Sioux City & Pacific and the Maine Central. It also includes the Norwich & New York Transportation Company and other boat lines, the New York Central & Hudson River Railroad and apparently every carrier interested in through freight lines doing business at Troy, Ala. Several of the defendants made no answers.

Interest in the present decision centers in the third paragraph (of the syllabus), which, as will be seen, deals with the application of the Interstate Commerce Law to cases where a road is unwilling to join in making a through rate and where its action in making a local rate produces what is practically a violation of the fourth section (the long-and-short-haul section) of the Interstate Commerce law. Those who have followed the decisions of the Commission and other events in connection with this part of the law will remember that there has been something like a controversy between the Interstate Commerce Commission and the courts. One of the principal decisions of the Commission was that on the Social Circle carriage-rate case. In that case the Commission ordered the railroads to comply with the letter of the fourth section or else to file applications for relief from it, showing cause. The railroads, however, did not comply, but took the case into the United States court, and Judge Newman, at Atlanta, virtually reversed the Commission's decision, holding that a railroad could decide for itself when and where to take advantage of the exempting clause of the fourth section. Judge Newman's opinion was reported in the *Railroad Gazette* of July 7 last. Since then the United States Supreme Court, in a case arising in Colorado, has issued a decision tending to sustain the position of the Commission (*Railroad Gazette*, July 28, page 568); and now the Commission comes out with this utterance making a further defense of its position.

The fourth paragraph of this syllabus very likely is sound, as applied to most cases of this kind which are likely to come before the Commission; but we should suppose that the railroad attorneys in the case would have reminded the Commission that there are innumerable instances in which the cost of handling freight received from another road is just as high as that for freight shipped locally. For instance, take cotton, referred to in this case, delivered by a boat line to a railroad company. The cost of loading this cotton and of billing it, the yard expenses—in fact, the total terminal charge—is probably just as heavy as though the cotton were shipped at the city freight-house. There are many railroad junctions where a transfer of freight from one road to another, even including the carload freight, is so costly that the charge may justly be as great as on freight brought by shippers residing in the town.

On the main issue, that concerning the power of the law over a railroad, which, in order to avoid submitting to the long-and-short-haul clause on freight received by it from another railroad, refuses to join in through rates, we cannot see that the Commission has at all strengthened its position. This decision is written by Commissioner Clements, and he has the faculty of expressing his ideas with clearness and reasonable brevity, but he fails to thoroughly analyze the questions relative to through billing and "common arrangements." Possibly he does not specifically aim to elaborate and strengthen the position of the Commission, as stated in the cases of the James & Mayer Buggy Co. and others, but one naturally looks for such a motive here from the fact that this is an important technical point in the construction and enforcement of the Interstate Commerce law and one which is strenuously contested by the Southern railroads.

It is true, as is stated in this case, that a road assenting to the rates named in a through way-bill is a party to those rates, in other words, a party to the through rate; but the decision uses the term "through bill," without stating precisely what is meant by it. It does not say but what the initial road issued a through bill of lading by adding the local rate of the other road and acting without that road's consent. Such a document might be called a through bill, but it is not a joint way-bill. A joint way-bill, delivered by one road to the other, is the only tangible document or transaction on which to hold the second road responsible for the through-rate making of the first, unless they have previously entered into an agreement. We do not find in the decision any detailed statement of the facts as regards these questions; the third paragraph of the syllabus is supported rather by argument and by reference to previous decisions.

Judge Clements says the fact that a carrier's proportion of a through rate is its local rate for the haul over its own road cannot relieve it from joint responsibility as a component of the freight line if the entire rate be violative of the law. But this does not meet the case. As has been said before, there is no denying that such commerce, if the freight has crossed a State line, is interstate commerce; but this does not establish assent to a "common arrangement" between the different carriers participating in the transaction. As was well stated in the Little Rock & Memphis case, which was decided by the Commission March 25, 1889, the Interstate Commerce Act . . . is inadequate to . . . require the establishment of a through route with through rates. It is impossible under that or any existing law to compel a joint arrangement, and therefore impossible to apply the fourth section of the law to the freight bill on a shipment—the bill rendered by the railroad to the shipper or to the consignee—which freight bill does not become a through bill until it appears before the Commission and is there declared to be such. The common law compels a carrier, say, the Lake Shore road, at Buffalo, to accept from the New York Central a shipment from Albany bound to Chicago, but it does not compel him to interest himself in the rate east of Buffalo. Judge Clements says: "The facts that the carriage is continuous, that the traffic is through interstate traffic and that the carrier, in due and ordinary course of business, accepts and forwards it, are sufficient to establish responsibility under the law." This is all right, but the responsibility is to the law as a whole and not to the fourth section. To reach an unjust rate in a case like the present one, it would seem necessary to fall back on the first section, which requires all rates to be reasonable and just, and is broad enough to cover all kinds of commerce which this constitution intended to place under Federal control. In short, this case affords another illustration of the fact that the fourth section is only a subordinate clause and of doubtful utility. The railroads can dispute the Commission's views on this section with considerable facility when they might have to go into a much more thorough argument if they attempted to justify themselves on the broad grounds that would apply if the fourth section were not a factor. Without that section, which Congress provided as a guide for settling a class of questions which are included under the first, second and third sections, the Commission would find itself in deeper water; but that would probably be no serious disadvantage. The opinions of the Commission depend, for their force, upon their reasonableness, and, we may say, their reasonableness in view of all the conditions, regardless of statutes. An unreasonable opinion falls ineffective, even if in line with a statute, and a reasonable one has some force even if there is no specific law under which it could be enforced. The fourth section has been of value as an educator, familiarizing people with the principle and with the need of complying with it wherever possible, but when we come to apply it to difficult cases it becomes too unwieldy to handle.

As affecting the present case, the decision, very likely, is just, although a cursory reading of the facts given in the report of the Commission is not sufficient ground for a confident opinion on this point. But where a small town ships the same kind of goods as a large city, and to the same market, under circumstances which are similar in all respects except the size of the shipping town and the aggregate annual quantity shipped, we have a case where the so-called sentimental reasons for applying the long-and-short-haul law are strongest. The reasons for favoring the larger place—its being a trade center or its having water competition, and the ability of the railroad to make a few dollars which it would otherwise lose—are so hard to explain to shippers in a convincing way, and their own side seems to them so strong, that a railroad is likely to find it best to yield without arguing the matter to a conclusion, though it knows the conclusion would be in its favor.

July Accidents.

Our record of train accidents in July, given in this number, includes 89 collisions, 87 derailments and 5 other accidents, a total of 181 accidents, in which 58 persons were killed and 176 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted except where the circumstances of the accident as reported make it of special interest.

These accidents are classified as follows:

COLLISIONS:	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	9	0	0	9
Misplaced switch	2	3	4	9
Failure to give or observe signal	5	2	0	7
Mistake in giving or understanding orders	0	9	0	9
Miscellaneous	8	3	4	15
Unexplained	15	7	18	40
Total	39	24	26	89

DERAILMENTS:			
Broken rail	1	Bad switching	3
Loose or spread rail	6	Open draw	1
Defective bridge	1	Animals on track	2
Defective switch	4	Landslide	1
Broken wheel	6	Washout	1
Broken axle	9	Drifted sand	1
Broken truck	3	Malicious obstruction	1
Fallen brakebeam	2	Maliciously misplaced switch	1
Defective brake apparatus	1	Accidental obstruction	2
Failure of drawbar	3	Unexplained	27
Loose wheel	1		87
Misplaced switch	9		
Careless running	1		

OTHER ACCIDENTS:	
Boiler explosion	1
Cars burned while running	2
Various breakages of rolling stock	1
Other causes	1
	5
Total number of accidents	181

A general classification shows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.	P.c.
Defects of road	0	12	0	12	6
Defects of equipment	9	25	2	36	20
Negligence in operating	40	14	2	56	31
Unforeseen obstructions	0	9	1	10	6
Unexplained	40	27	0	67	37
Total	89	87	5	181	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other acc'd'ts.	Total.
Passenger	28	25	2	55
Freight and other	131	64	3	198
Total	159	89	5	253

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
KILLED:				
Employees	22	14	0	36
Passengers	3	7	0	10
Others	6	6	0	12
Total	31	27	0	58
INJURED:				
Employees	60	18	1	79
Passengers	33	52	1	86
Others	3	8	0	11
Total	96	78	2	176

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. killed.	Pass. injured.	Emp. killed.	Emp. injured.
Defects of road	0	3	2	3
Defects of equipment	0	7	2	6
Negligence in operating	10	51	23	62
Unforeseen obstructions and maliciousness	0	1	6	6
Unexplained	0	24	3	2
Total	10	86	36	79

Thirty-two accidents caused the death of one or more persons each, and 38 caused injury but not death, leaving 111 (61 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with July of the previous five years shows:

	1893.	1892.	1891.	1890.	1889.	1888.
Collisions	89	83	73	84	72	61
Derailments	87	104	91	59	68	86
Other accidents	5	5	5	6	3	10
Total "	181	192	169	149	143	157
Employees killed	36	29	29	47	29	48
Others "	22	16	63	23	10	12
Employees injured	79	77	91	116	73	92
Others "	97	73	121	133	74	77
Passenger trains involved	55	82	67	64	62	63
Average per day:						
Accidents	5.84	6.19	5.45	4.81	4.61	5.06
Killed	1.87	1.45	2.97	2.26	1.26	1.93
Injured	5.68	4.84	6.84	8.03	4.74	5.45
Average per accident:						
Killed	0.320	0 234	0.544	0.469	0.278	0.382
Injured	0.972	0.781	1.254	1.672	1.028	1.077

The most fatal train accident in July was that at Newburgh, N. Y., on the 13th. The principal point of interest in this case, that concerning the distant signal and the man who was in charge of it, has been already discussed in our editorial columns. The responsibility of the engineman for not seeing the switch target earlier and reducing his speed more than he did, is another phase of this accident which has not been discussed, and concerning which the Railroad Commissioners give no information. In a situation like that at Newburgh the switch target is the home signal, and it is important to remember that a clear distant signal does not absolve enginemen from the duty of looking at the home signal with which it is connected. The proper rule for a distant signal is that when it is "off" the home signal *may be expected* to be found off.

The Baltimore & Ohio had a bad derailment at Monroe Falls, O., on the 25th. Fortunately, no one was killed outright, but the number of injuries was large. The Railroad Commissioner of Ohio examined the scene of this accident and came to the conclusion that the derailment was not due to defective track. The accident at Dodgeville, Mass., on the 25th, will probably be reported upon by the Massachusetts Railroad Commissioners.

One of the most startling accidents of the month was the collision at East Aurora, N. Y., on the 18th, where an excursion train carrying a large number of children ran over a misplaced switch. The man in charge of the switch was held responsible, as he left it set for the side track while he went away some distance; and at the same time the engineman is blamed for approaching the station with his train (an extra) not under perfect control, according to the rule. This accident occurred about the same time that a passenger train was derailed at Watertown, N. Y., in consequence of the malicious misplacement of a switch; and the circumstances afford a striking contrast between the two cases. At Watertown, according to reports, the engineer, missing the switch lights (which had been extinguished) checked his speed, so that although most of the train was derailed, the cars were not overturned and no one was hurt. How many runners are careful to invariably check their speed when they do not see a switch light at the proper point? If such a light ought to be seen 1,500 ft. before reaching it, but does not show up at that point, and the runner then hesitates for a few seconds before deciding to shut off steam, his indecision may cause disaster; it is negligence, certainly.

At Wilkes-Barre, Pa., on the afternoon of the 4th, about 20 passengers were injured by jumping off an electric street car when they thought a collision was impending. The motorman also jumped off without shutting off the power, but a passenger immediately took his place and no collision occurred. At Forty-seventh street, Chicago, on the 17th, a train of the Chicago & Grand Trunk ran into a horse car crossing the railroad, causing the death of three and the injury of nine persons. In Cleveland, on the night of the 23d, a hand car containing 8 trackmen was struck by an electric car at a crossing, injuring two men.

About 100 men have been suspended in the Accounting Department of the Pennsylvania road at Philadelphia, and it is stated in Philadelphia papers that some passenger trains will be taken off of several divisions terminating in that city, evidently meaning that the discontinuance of trains at the end of the summer season will be more extensive than has usually been the case. The Baltimore & Ohio has made a reduction of 10 per cent. in the salaries of all men receiving $150 a month or more. The Receivers of the Richmond & Danville have reduced the pay of officers and employees as follows Those now receiving $100 per month, and up to and including $208.34 per month, 10 per cent. Those now receiving $208.34 per month, up to and including $416.67 per month, 15 per cent. All receiving over $416.67 per month, 20 per cent. The Cleveland, Cincinnati, Chicago & St. Louis has reduced the pay-roll of trainmen about four per cent., but the rate of reduction, it is stated, varies from one per cent. to 10 per cent. All officers receiving over $5,000 a year will be reduced 20 per cent., and those receiving between $3,000 and $5,000, 15 per cent. On the Flint & Pere Marquette all employees receiving $50 a month or over have had their pay reduced 10 per cent. The Chicago & Eastern Illinois and the Chicago Great Western have reduced all salaries. It is said that the reduction is 10 per cent. The Receiver of the Louisville, St. Louis & Texas has ordered a reduction of 10 per cent. in the wages of all employees. On the Union Pacific the expected reduction of pay went into effect Sept. 1, and is as follows: On salaries from $60 to $100, 10 per cent.; $100 to $200, 12½ per cent.; $200 to $500, 15 per cent.; over $500, 20 per cent. The trainmen of the Denver & Rio Grande, after much growling, have accepted a reduction of pay. According to press dispatches the officers of the road had to first reduce their own salaries, doubtless "as an evidence of good faith."

Press dispatches of Sept. 1 reported that employees of the New York & New England threatened to strike on account of the reduction of 10 per cent. in their pay. The report seems, however, to have been colored by interested parties, and the same appears to be true concerning the reports from Louisville about trouble on the Louisville & Nashville. President Smith announced a reduction some time ago, to take effect Sept. 1, and numerous reports of strikes of shopmen and discontent among engineers have been published since, but it is difficult to estimate their real importance. Mr. Arthur and other brotheroood chiefs were called to Louisville, and it appears that on Sept. 2 an agreement was made that the men should accept the reduction with the promise of a conference on Dec. 1 to consider the readjustment of wages. A considerable number of the men in the shops did actually strike, and it appears that they had no part in the agreement by which the Brotherhoods accepted the reduced pay. On Thursday of last week it was reported that all trains on the Jacksonville Southeastern, except mail trains, had been stopped on account of a strike of trainmen, who complained that their wages had not been paid since June; trains resumed running the next day, however, a compromise having been effected.

It has been apparent for some time than the Nicaragua Canal enterprise was in straits for money. The failure to get a government guarantee last winter left the company in the position of being obliged to get money to carry on the work as a private enterprise on its merits. That would have been hard in the easiest times and is impossible in times like these. At a recent meeting of the Canal company a proposition was brought forward that the company issue $85,000,000 in bonds, the estimated cost of the canal being $56,000,000 and the difference to be used for the payment of interest during construction. The idea was to start an "active propaganda all over the country" and to seek popular subscriptions. Such an effort would have been a public declaration of the desperate condition of the project. The American people are not easily led into investments which capitalists decline to make. There was a time when a great railroad company by skillful use of the press, even of the religious press, was able to get popular subscriptions to its securities, but that time passed long ago. The Panama history would have made such an effort on the part of the Nicaragua Canal Company even more hopeless than a similar attempt on the part of any other enterprise would have been. The other course was to get capitalists to put up their own cash or to get Congress to vote to use other people's money to help the matter along; but both of these plans had been tried and had failed, and now the Nicaragua Canal Construction Company has been put into the hands of a Receiver. The Receiver appointed is Mr. Thomas B. Atkins, Secretary and Treasurer of the Nicaragua Maritime Canal Company, which is the parent company. The construction company is capitalized at $12,000,000, said to be paid up, but its floating debt is said by the newspapers to be $500,000. As the greatest amount said to have been expended is between four and five millions, there is natural curiosity as to what was paid for the $12,000,000 stock. The Nicaragua Maritime Canal Company, under which the construction company holds the contract for building the canal, is capitalized at $100,000,000, and this company holds the concessions. One of the Directors has said to the reporters that the receivership will not affect the parent company.

At College Point, N. Y., a short time ago, the town Board of Health seized the railroad station, expelled the agent and operator, and posted notices on the doors stating that the building was closed by order of the Board. The cause for this action was the unsanitary condition of the building. The reports do not indicate in what particular it was dangerous or offensive, but it is easy to believe that the trouble was with the privies, or water closets, and that the cause for the reporter's apparent excess of modesty in omitting to give details was such as would lead any one to spare the reader's sensibilities. It is stated that the railroad company had for several weeks pursued a dilatory course in dealing with the Board of Health, but that this summary action had the desired effect, the Superintendent making the required improvements without delay. We do not know anything of the merits of this particular controversy, but as there are some hundreds of towns where just such action ought to be taken, it is a pleasure to chronicle the action of this Board of Health, even though it may have been three weeks in doing what it ought to have done in three hours. In a matter in which there is such universal neglect of duty, the general indifference warrants a hopeful commendation of even a faint show of activity. In spite of the improvement in these sanitary matters during the past few years on American railroads, it is true that a great many small stations still remain a disgrace to the men in charge of them. Besides the cases where the health of employees and passengers is absolutely endangered, and where, as we have intimated, a dilatory Superintendent deserves no mercy if Boards of Health use compulsion, there are many more which are only slightly less offensive, and which are about equally potent in giving the road an unpleasant reputation. It is true that 999 out of every thousand men who are charged with a duty in connection with a station privy will shirk it, and that the duty of the Superintendent is therefore both unpleasant and unending; but there is no alternative; as long as *he* shirks or falls short in vigilance, his road will be disgraced.

The Committee to recommend standard sizes for pamphlets and specifications for the Master Car Builders' Association have practically agreed upon the following sizes:

Postal card circulars	3¾ × 6¼ in.
Catalogues, "soft" covers	3½ × 6 "
Catalogues, soft and hard covers	9 × 6 "
" " "	12 × 9 "
Specifications	8¼ × 10¾ "
Letter paper	8¼ × 10¾ "

The Committee has issued a circular asking for suggestions from members of the association. The adoption by railroads and by manufacturers of railroad supplies of uniform sized circulars, specifications and catalogues would aid much in bringing "order out of chaos" in railroad offices. The classification of catalogues is a constant annoyance in an office, because they come of every size and shape that fancy can suggest. We would suggest that the Committee recommends in its report the maximum number of pages or the greatest thickness that the smaller catalogues should have, so as to have some degree of uniformity of thickness. A 3½ × 6 in. catalogue an inch thick were much better made into a 9 × 6 catalogue only half as thick. The recommendations of the Committee conform to good practice and the smaller sizes are such as may be conveniently obtained by subdividing the larger sizes in a cabinet or drawer. Without doubt the recommendations of the Committee will be adopted, for every railroad officer has suffered the annoyance which they are intended to abate. It would be a good thing if the recommendations could go still farther and touch upon standard sizes for drawings and blueprints. Much inconvenience and disorder would be done away with by the adoption of a uniform rule by railroad offices.

The *Pathfinder* Railroad Guide prints the following, which seems to be a copy of an official order:

"New York, New Haven & Hartford Railroad, Old Colony System, Providence Division.—For the benefit of the service, it is necessary that employees discharged for cause from one department shall not be employed in another department without a statement of facts leading to such dismissal and permission from the head of the department discharging them; and heads of departments and agents will notify the superintendent at once of names of all discharged employees and cause of dismissal. This rule is imperative.

"Hereafter, those having direct charge of employees will not retain in their forces relatives or members of their families. All existing cases conflicting with this order can be arranged by transfer of such employees between the several departments."

Interest centres in the second paragraph, which is quite unusual, if not unheard of, on railroads. While such a rule would no doubt be beneficial, it must require some changes of considerable consequence (unless circumstances on the Providence division are different from those of most old railroads), and it seems odd that

it should be issued on one division only. There are, doubtless, cases where men appoint their sons to such positions as confidential clerk or chief assistant, and the results are not harmful; the father's efficiency is prolonged more effectively than it would be by a less sympathetic helper, and the son's training is in some respects better than it would be under a less sympathetic tutor; but in general probably the rule is all right. It would seem important enough, however, to be a feature of the fixed policy of the company throughout its territory; and—how about the exceptions among the higher officers?

That was a good quality of law which an Alabama court laid down in the case of a brakeman who was injured just after jumping off the front end of a moving engine. The case is the 13th in our railroad law column in this issue. It was shown that well-regulated roads permitted such practice among switching gangs, and this was, indeed, a kind of evidence which generally has great weight with the courts; but the judge in this case refused to admit that kind of evidence and seems to have been guided by his own common-sense; and we think he was right. There are some things which no amount of practice or familiarity can change from dangerous to safe, and jumping off the front of a moving train is one of them. The next case reported—the 14th—seems at first sight to have been decided in a manner contradictory to that of the Alabama case, and we are not sure but the Missouri court does espouse the opposite principle; but there was at least the statement that the speed was very low, and it does not appear that the brakeman who jumped upon the engine stood squarely in front of it.

NEW PUBLICATIONS.

The Technic, 1893.—Published annually by the Engineering Society of the University of Michigan, Ann Arbor, Mich. Price 50 cents.

This is a pamphlet of 112 pages made up of short papers contributed by graduates or undergraduates of the engineering department of the University of Michigan The issue for 1893 contains 12 different papers with a group of miscellaneous notes. The papers include one on Variation of Latitude, one on the Metallurgy of Aluminum, one on Lake Superior Copper Ores, quite a long one and apparently a good one on Transit Adjustments, a short one on the Elevation of the Illinois Central Railroad Tracks, etc.

Journal of the Association of Engineering Societies, July, 1893.—The first chapter in this issue is on the Lining of the Wickes Tunnel, on the Montana Central Railway, written by Mr. E. R. McNeill, Assistant Engineer in charge. It was read last January before the Montana Society of Civil Engineers. It is an excellent paper, giving very briefly the history of the tunnel, and in detail, with numerous illustrations, an account of the lining of it. The tunnel was pierced through in September, 1888, and it was found necessary to timber it throughout. In September, 1891, a contract was let for lining it with masonry, as it was thought expedient to begin this work before the timbering had been weakened by decay. Active work was begun on this in January, 1892. In the first year 1,600 ft. of tunnel had been lined and it was estimated that a year and a half more would be required to complete the work. The total length of the tunnel is 6,112 ft.

Another chapter of considerable value is a long one on Methods and Results of Precise Leveling, by Mr. O. W. Ferguson, of the Engineers' Club of St. Louis.

The Status and Extent of American Domestic Water Commerce. By Tomas J. Vivian.—This is a pamphlet reprint of an address delivered by Mr. Vivian before the World's Commeree Congress at Chicago in August. Mr. Vivian was in charge of the transportation statistics of the last United States census, and consequently has at his command a good many facts. The argument of his pamphlet is that, while our foreign carrying trade has diminished, the increase in the domestic carrying trade has been largely compensatory: that this domestic commerce has developed into an industry of extraordinary extent; that our carrying fleet is larger than Great Britain's, and that the distances made in average trips on inland waters are frequently equal to those made by English vessels on foreign voyages. For instance, the average distance of trading trips on the Mississippi is 759 miles; the average distance on the Great Lakes is 566 miles; but the lake route from Ogdensburg to Duluth is 1,285, and the river route from St. Paul to the head of the Passes is 1,780 miles. The average distances made by coasting craft on the Atlantic coast and Gulf of Mexico is 377 miles, but these routes include one from Calais, Me., to Point Isabel, Tex., which is 2,597 miles.

Minnesota Railroad Commission: Annual Report.—This report, for the year ending Nov. 30, 1892, has just been issued. It is in the usual form, and, aside from statistics and a report of a few cases that have been heard by the Commission, contains little of importance, save the reports of the State Grain Inspector and Weighmasters. The few railroad statistics of general interest were given in the *Railroad Gazette* of Dec. 16, 1892.

The report of the State Grain Inspector shows a total of 221,546 carloads of grain inspected and graded out of this number, but 16,410 reinspections were demanded, and of these the grade of 7,403 cars remained unchanged. Inspection and grading are unimportant, as very little grain is sold at terminal points except upon the grade so fixed. This report also refers to the care of cars containing grain, after their arrival at terminal points, and recites the agreement as to sealing, etc., entered into by the railroads, elevator and mill companies. This agreement was incorporated, practically, in a law enacted during the last session of the legislature and upon the recommendation of the Commission. Inspection at primary markets is also advised in this report, and the recommendation was met by the passage of an act providing for the same, last spring.

The reports of the State Weighmasters showed that there were weighed into and out of elevators and mills 300,064 carloads of grain, besides 46,023,605 bushels weighed out in carloads from Duluth. State Weighmasters' certificates of weights are accepted, not only by the railroads, but by the buyer and seller of grain as well.

Universal Bi-Metallism and an International Monetary Clearing House. By Richard P. Rothwell, editor of the *Engineering and Mining Journal*. New York: The Scientific Publishing Co., 1893.

The failure of the Brussels conference to suggest any plan for the permanent solution of the silver problem led Mr. Rothwell to suggest the plan which was published in the *Engineering and Mining Journal*, Dec. 3, 1892, and which is here reprinted in book form. To the original paper he has added the substance of certain addresses and editorials which were called out by its publication, together with statistical data of great value in the discussion of the question of the ultimate standard of values. These statistical data include a statement of the monetary and banking systems of Europe and British India compiled by Mr. Leech, Director of the Mint; tables of statistics of the world's production of gold and silver for many years; tables of the ratio of gold and silver to each other for more than 200 years, of the prices of silver for many years and a chronology of the gold and silver industry for 450 years. The whole volume is but 52 pages besides an index, but it furnishes suggestions and equipment for study that make it not only singularly valuable but intensely interesting at this critical period in the financial history of the United States.

Mr. Rothwell's suggestion is the establishment of an international monetary clearing house or commission composed of experts representing the various nations. This commission should select the universal monetary standard and adopt measures for securing the use of gold and silver on such a flexible ratio as will effect permanent stability in the value of the world's money, and finally adopt measures for facilitating international monetary transactions and for their supervision and control. The scheme of this clearing house is developed on the assumption that it would adopt the principle of universal bi-metallism on a flexible ratio.

TRADE CATALOGUES.

Transmission of Power: A Description of Systems and Apparatus Furnished by the Westinghouse Electric & Mfg. Co. By L. B. Stillwell, Electrical Engineer, Pittsburgh, Pa. 1893.

Perhaps the time has not yet come to protest against the luxury of trade catalogues, but it must be pretty near. It would be difficult to find any class of publications got up more sumptuously than are the finest trade catalogues nowadays. The one before us is a good example of what we think must be a waste of money in heavy plated paper, profuse illustration, much of which is merely ornamental, and beautiful printing. But when we have said that, we have said all that there is to say against the pamphlet. In its favor, one may properly say that it is a very useful and interesting publication. The first chapter is on distance and electrocomotive force. This develops the theory of the economy resulting from the use of high potentials in transmitting power to a distance, which is illustrated by charts and tables. It is followed by a chapter on insulation for high potentials, on transformers, direct current systems and on alternating systems. There are descriptions and illustrations of generators of various sorts and of the Tesla polyphase motor, and, finally, there is a chapter on auxiliary apparatus and switchboard instruments.

European Practice in Locomotive and Car Wheel Tires.

At the last meeting of the International Railroad Congress held at St. Petersburg, an elaborate report was presented dealing with the subject of tires for the wheels of locomotives and cars in the most exhaustive manner. It appears that the general practice of the European countries is practically the same, and that it does not differ very materially from our own.

The material used for tires is almost invariably specified to be crucible, Bessemer or Siemens-Martin steel. Where the first is used it is called for for locomotive tires, while the same roads will use the Bessemer steel for car wheels. The specifications are those with which we are familiar, requiring that the tire shall be rolled from a single solid ingot; that there shall be no welds, flaws, blowholes or cold shuts, and that the variation from perfect rotundity or from the specified section shall not exceed a certain given amount. This variation from the specified diameter is placed at from one to two millimetres (.039 in. to .078 in.). Some roads require that the tires shall be annealed after rolling; some simply specify annealing; others give the time during which they are to remain in the annealing furnace. It is the universal practice to require the manufacturer to furnish one tire out of each lot of fifty or one hundred, free of expense to the railroad company, for testing purposes, and it is upon the results obtained in these tests that the lot is to be accepted or rejected. These tests include drop and tensile tests, but very little, if any, stress is laid upon chemical composition. Occasionally a road specifies the carbon, silicon or phosphorus, but usually this is entirely omitted. The ordinary requirements are that the tensile strength shall be in the neighborhood of 70,000 lbs. per sq. in.; that the elongation in a length of 8 in. shall be from 15 per cent. to 20 per cent., though in some instances the specifications require that the contraction shall be at least 25 per cent. of the original section at the point of rupture. The standard for locomotive tires is, furthermore, invariably higher than that of the passenger and freight cars, the latter being the lowest of all.

Especial emphasis is invariably placed upon the marking of each tire; and these marks include the number of the heat from which it was made, the shop stamp of the contractor, a date giving the month and year of manufacture, the metal used and, finally the inspector's mark of acceptance. These marks are always on the outside face of the tire near the inner edge.

The specifications for the drop test offer the greatest variation. They usually require that there shall be a heavy and substantially constructed bedplate or anvil, but the weight of the drop and the height of the fall are subject to considerable variation. For example, on the state railroads of France, the drop weighs 1,323 lbs., and is let fall from a height of 14 ft. 9 in., the tires to sustain the first blow without showing any crack or flaw, and the second without breaking. On the Eastern Railroad of France, on the other hand, the drop weighs 2,200 lbs., and "for steel tires with a thickness of 2.56 in. the height of the fall of the drop is fixed at 16.4 ft.; but when the thickness of the tires is greater or less than 2.56 in. the height of the fall shall be increased or dimnished 2¾ in. for each millimeter (.039 in.) of variation in the thickness of the tire. Tires are required to sustain four blows without fracture." The metal of the tire is also required to be fine grained and sound, and of such low carbon that it will not harden when plunged at a cherry red heat into cold water.

In addition to the drop and tensile tests, manufacturers are compelled to guarantee their tires for a certain length of time, usually four years, or until a predetermined mileage had been made before the first turning, ranging from 40.000 miles to 70,000 miles. But if the mileage is not made before the time limit expires, the guaranty is cancelled with the time limit. The prices range from 1.68 c. to 6.07 c. per lb.

When we reach the question of tire fastening to wheel centers the devices cover the whole range of invention in that regard. It may be said that tires are never held in position by shrinkage alone, the nearest approach to this being in the case of a Hungarian and a Danish road where the tire is held by a tap bolt entering but not threaded into the tire. Retaining rings predominate, though bolts are very frequently used, and many of the latter extend through the tire and are inserted from the outside, while some are put through the rim from the inside and are screwed into the tire. The retaining rings are of all conceivable sizes and shapes and are held in position by bolts as well as being sprung into place and held by riveting metal over them. The report divides the methods of fastening into eight heads: 1, rivets or bolts passing through the rim and tire; 2, tap bolts; 3, blind rivets; 4, retaining rings; 5, dovetailing the rim into the tire and holding with a screw; 6, dovetailing a ring let into the tire and held by riveting over; 7, the same on one side and rim dovetailed into tire on the other; 8, retaining rings on both sides.

While there are no standard specifications that obtain throughout the railroads of the Continent, or even through these of a single country, and while there are wide variations in the details of the requirements demanded, there is a general similarity that would seem to render it possible to systematize the whole and bring the specifications down to a basis that could be very readily made universal.

TECHNICAL.

Manufacturing and Business.

The "Standard" M. C. B. coupler has been adopted as the standard for the passenger and freight equipment of the Great Northern. This coupler has already been applied to the entire passenger equipment of the road and all freight cars passing through the shops for general repairs are so equipped.

The directors of the Michigan Peninsular Car Co. have declared a dividend of two per cent. on the preferred stock and a semi annual dividend of three per cent. on the common stock. The company is reported to have earned over 15 per cent. on its common stock after paying 8 per cent. on the preferred and all fixed charges.

H. P. Sweet, of Los Angeles, President of the Metal Cross Tie Co., is negotiating with the Colorado Fuel &

Iron Co. for the manufacture of a trial order of steel railroad ties.

The Wilkes-Barre & Hudson River Improvement Co., building the Wilkes-Barre & Eastern Railroad, has recently ordered two 60-ft. turntables of the Passaic Rolling Mill Co.

The Mandel Safety Gate Company, of Chicago, has been chartered with a capital stock of $150,000, to manufacture bridges and safety gates; incorporators, William A. Vincent, Hamilton Anderson and Francis Walter Coler.

The Pittsburgh Reduction Co. is now getting out details and plans for the new shops at Niagara Falls, which it is expected to have in operation about Feb. 1, 1884. The electric power will be furnished by the Niagara Falls Power Co. The plans provide for a brick building 200 ft. long and 70 ft. wide, in which the electrolytic process for the manufacture of aluminum goes on. The transformation of the current used will be in an iron building of about 100 × 70 ft., and there will be three other buildings used for storage and the like of about 70 ft. span and 100 to 150 ft. in length each. The site that has been located is a block of about four acres of ground situated some half a mile up the river from the main power station of the Niagara Falls Power Co.

A receiver was appointed last week at Watertown, N. Y., for the Moffett, Hodgkins & Clarke Co., constructors of water works, electric light and power plants, street and steam railroads. The company's assets, chiefly water, railroad and electric light bonds, amount to $1,926,000. The direct liabilities amount to $800,000 and the contingent liabilities to $450,000.

The National Tube Works Co., of McKeesport, Pa., has resumed operations this week in another puddling department, comprising 22 furnaces, and the finishing department has resumed. These departments have been closed from four to ten weeks. About 2,000 men are now at work in the plant where only fifty were employed three weeks ago.

Iron and Steel.

All the mills of the Pennsylvania Steel Co., at Steelton, Pa., start up on Sept. 9, giving employment to 2,000 men.

Every department of the Carnegie steel plant in Homestead, Pa., was started on Sept. 4, giving employment to about 2,000 men.

The large plants of the Oliver Iron & Steel Co. and the Hainesworth Steel Co. were placed in operation on Sept. 4, with non-union men.

The Maryland Steel Co. is now delivering the rails for the Bangor & Aroostook road in Maine, the contract being for 11,000 tons of 70-lb. rails. The rails are being sent to Bangor by water.

New Stations and Shops.

At Elkins, W. Va., the West Virginia Central & Pittsburgh Railroad is making an addition to its shops which will increase the capacity one-half. The addition is to be of brick and will be fitted up with machinery of modern pattern.

Cuban Bridge Contracts.

The Union Bridge Co. has just completed an order for about 500 tons of single track bridges and viaducts for the Western Railway of Cuba. This work is part of the construction under the charge of James Livesey & Sons, Consulting Engineers, of London.

Trainshed of the New Union Station at Boston.

The contract for the Causeway street trainshed for the new Union Station of the Boston & Maine at Boston has been let to the Pennsylvania Steel Co., and the manufacture of the iron work is being pushed actively. The contract calls for a portion of the structure to be completed by Oct. 1. A large shipment of the structural material has been delivered and erection commenced the last of August. The ground plan is 480 ft. by 320 ft., and the steel work will weigh about 1,500 tons. The architects are Messrs. Shepley, Rutan & Coolidge, and the designer and consulting engineer of the iron work Edward S. Shaw, C. E., of Boston.

A Bridge 351 Ft. High.

The highest railroad bridge in Germany is now under construction on the line of the Solingen-Remscheid Railroad, a line seven miles long. This viaduct will be double track, 1,640 ft. long and 351 ft. high above the water surface, with an elliptical arch of 558 ft. span in the center. The total of iron in the structure will be 4,100 tons, and the estimated cost, including 13,080 cu. yds. of masonry, is about $625,000. The work of construction is expected to occupy two years.

The Chicago Drainage Canal.

Action has been taken by the drainage board by which from 1,200 to 1,500 men can be put to work on the canal within the next two weeks. It has been decided that the men to be employed must be citizens of Chicago and heads of families, and they will be put to work on the four miles of channel just below Willow Springs on the McArthur and Harley sections. Both of these contractors have refused to work because of a conglomerate rock they met with which they claim they are unable to excavate at the contract price. The board has entered into agreements with these contractors by which terms they are to act as agents of the board, subject to the board's engineering department. The contractors are to have direction of the force to be employed, and are to be paid 15 per cent. of the contract price for the use of the equipment the contractors have now on the grounds. Agnew & Co. have put 500 additional men at work and expect to employ 400 more in a few days.

The Angamar Motor.

The Angamar motor is creating renewed interest in Chicago. One has been running at intervals recently on the Western avenue line of the West Chicago Street Railroad for inspection by engineers and others interested. The motor is about the size of the ordinary street car but is higher. Under the floor is a steam boiler, extending the full length of the car, constructed to carry 200 lbs. steam pressure; it is provided with a short firebox. The cylinders are 9 × 10 in. and the pistons are connected to the driving wheels in the manner common in locomotive practice. On top of the car is a condenser into which the steam is expanded, after doing its work in the cylinders, and in which it is condensed. The condenser is made of two sets of tubes, the smaller placed inside the larger, the steam being admitted into the space between the two sets. The air circulates through the smaller tubes and outside of the larger ones. The condensed steam is returned to the boiler by means of a pump.

The scheme for operation is to charge the boiler of the motor with steam and hot water to the maximum pressure from a stationary boiler, and after filling the firebox with burning anthracite coal the motor is ready for a trip of from 20 to 30 miles, hauling one or two trailers, after which it is recharged from the stationary boiler.

The advantages claimed for this motor are that there is no cable, electrical conductor or power plant to get out of order that will tie up the whole road; and that the steam used is generated with the efficiency of a stationary boiler rather than of a locomotive boiler, since the little coal that is consumed in the firebox of the motor is not burned under forced draft.

As has been stated by well known engineers, the theory of the device is correct; that is, the steam is generated in a boiler which is very large compared with the cylinder capacity, thus dispensing with the necessity of forced draft; the steam exhausted from the cylinders is condensed and returned to the boiler; and the boiler is supplied with water at high temperature. If the condenser can be made to work satisfactorily there can be no objection on the part of pedestrians and drivers of horses to using this motor for street car service, for no smoke will show from the stack, there will be no cinders, and the exhaust from the cylinders will neither be heard nor seen.

The J. A. Fay & Egan Co.'s Chicago Exhibit.

Woodworkers visiting the World's Fair have an unparalleled opportunity to study the different kinds of machinery used in their lines, both from American and European shops. One can hardly comprehend without such an inspection the skill and enterprise of machinery builders, and the reason for the high reputation of the work of American planing mills, sash, door and blind factories, etc. The exhibit of the J. A. Fay & Egan Co. in Machinery Hall is particularly notable, being the most extensive showing of woodworking machinery ever made by any one firm at any exposition. This exhibit occupies a space of 6,000 sq. ft., and there are 46 machines, among which are rip and cross-cut saws, band saws, scroll saws, planers of various sizes, sanders, boring, tenoning and mortising machinery, lathes, molders and dove-tailing machinery.

One of the most striking and noticeable features of the exhibit is the No. 6 band resawing machine, designed for use in mills and capable of resawing stock up to 48 in. in width, and to the centre of 24 in., or of cutting a thin sheet or board from the side of a piece of timber 12 in. thick.

The large Fay hollow-chisel car-mortising machine is another machine of especial interest to railroad men. This bores a square hole by the use of a square hollow chisel with an auger revolving in its center, the chisel by power squaring the hole produced by the auger.

The new Fay triple-drum sander is another interesting machine. It is made in sizes of from 30 to 60 in. The drums are of steel, three in number, and the sand paper is graded and placed upon these according to the work to be done. Each drum has an oscillatory or vibratory motion laterally across the material to prevent the formation of lines, which would result from a true rotary motion. The adjustment of the drums for a lighter or heavier feed is controlled by hand wheels within the reach of the operator. A brush attachment cleans the material as it leaves the machine.

The line of machinery manufactured by this concern consists of over 1,000 machines, and it is claimed that no woodworking factory wanting machinery need go outside of this firm for any part of its equipment.

THE SCRAP HEAP.

Notes.

A passenger train of the St. Louis & San Francisco was stopped by robbers at Mound Valley, Kan., on the morning of Sept. 3, and the express messenger was killed. All the passengers were robbed.

Texas papers report that a train of the Houston & Texas Central on Aug. 26 ran from Ennis to Denison, 108 miles, in 2 hours 10 minutes, making all the usual stops. The speed, excluding stops, was about 60 miles an hour.

President Van Horne and General Passenger Agent McNicoll, of the Canadian Pacific, who were indicted in the state of Washington on account of the alleged illegal sale of a ticket over the Canadian Pacific, have given bonds to appear for trial Nov. 16.

The adjourned meeting of General Managers was held in Chicago Aug. 31. Representatives from some 20 or 40 roads were in attendance, but the representation was not considered sufficient to warrant taking any decided steps towards the formation of either a national association or similar associations at other points, and the meeting adjourned after a discussion of the scheme.

World's Fair Notes.

The number of paid admissions to the Exposition up to Sept. 1 amounts to 10,000,000, the total number for August being more than three times as much as those of May, and about 40 per cent. larger than either June or July. The average daily attendance for the past two weeks has been over 150,000, and a slight increase in this for the months of September and October will bring the total attendance up to 20,000,000 for the entire time.

Friday, Sept. 15, will be celebrated as Railroad Day, it being the anniversary of the opening of the Liverpool & Manchester, 63 years ago. This day is also the one of the annual meeting of the General Roadmasters' Association in Chicago, and they are expected to attend to the number of 400. In the Transportation Building the exhibitors will keep open house.

A Pass Fraud.

Mr. W. T. Kelly, Superintendent of the Missouri Pacific at Little Rock, Ark., writes us that a person named J. W. Elliott is traveling around the country, presenting requests for passes purporting to have been signed by Mr. Kelly. These letters state that Elliott has been employed as yardmaster at some point on the St. Louis, Iron Mountain & Southern, or possibly as despatcher. They bear the impress of a round stamp reading, "St. L., I. M. & S. Ry., Little Rock, Office of Superintendent," date in center. The day of the month is very much blurred.

Mr. Kelly says that all such letters are rank forgeries, and railroad officers are requested to take them up, if presented, and send them to him.

The Exposition Flyer Breaks Its Record.

The flyer of the Lake Shore and New York Central has again broken its own best record. On Aug. 31 the train was delivered to the Lake Shore at Buffalo 90 minutes late, and it arrived in Chicago but 24 minutes late. Only twice before has it failed to reach Chicago on time. The Western Division, from Elkhart to Chicago, 101 miles long, was traversed in 115 minutes. This time included a reduction of speed to six miles an hour in South Bend and to 10 miles in La Porte, with four complete stops at South Chicago, Grand Crossing, Twenty-second street and Sixteenth street, and low speed all the way in from South Chicago.

California Mid-Winter International Exposition.

The general plan for the grounds and buildings in Golden Gate Park, San Francisco, has been finished, submitted and accepted by the Executive Committee, and work has already commenced. The buildings will be as nearly fireproof as possible, and will be in design Oriental or Moorish, Aztec, early Spanish mission, etc., with roofs partially covered with skylights. The ground area of the principal buildings will be as follows: The Manufactures and Liberal Arts Building, not less than 450 × 200 ft.; the Fine Arts Building, not less than 120 × 60 ft.; the Agricultural and Horticultural Hall, not less than 300 × 125 ft.; the Mechanical Arts Building, not less than 275 × 175 ft; and the Administration Building, not less than 60 × 40 ft. The Transcontinental Freight Rate Committee, representing all the principal Western lines, will return all property, except racehorse transportation, free, which has been sent over their lines to the Exposition, under the condition that full tariff rates have been paid on them going out and return shipment is within 90 days after the close of the Exposition. The Southern Pacific Company will lay a spur track for carrying freight to the grounds. Visitors will have ample facilities for reaching the grounds by street cars, the tracks of five lines being extended to the principal entrances.

The Chesapeake & Ohio European Line.

The new line of the Chesapeake & Ohio from Newport News to Liverpool will begin service next Saturday, Sept. 9. A considerable party has been invited to be present to see the sailing of the first vessel. An English company called the Chesapeake & Ohio Steamship Co., Ltd., was organized, through the efforts of the officers of the Chesapeake & Ohio Railroad Co., to establish this line with a capital of $1,000,000 and $750,000 in five per cent. debentures, and the railroad company subscribed for $600,000 of the stock. The contracts were let in 1892 for building six vessels for the line. Three of the ships, Appomattox, Greenbrier and Chickahominy, are are being built at West Hartlepool, England. They are 345 ft. in length with cargo capacity of 5,000 tons measurement, and fittings for 550 head of cattle. The other three ships are being built at Linthouse on Clyde, Glasgow, and are named Rappahannock, Shenandoah and Kanawha. They are 370 ft. in length with cargo capacity of 6,785 tons measurement each, and fittings for 770 head of cattle each. The Rappahannock is now ready for service, and will take cargo at Newport News this week. The Appomattox is booked to sail from England in a few days. The six ships are expected to make weekly sailings from Newport News. This will allow six weeks for the round trip, including the taking on and discharging of cargo. It is very probable that other ships will be added to the fleet, but no arrangement has been made as yet for them.

A party of about 150 or 200 of the guests from the West and Northwest will go by special train from Cincinnati, leaving there Friday morning, Sept. 8, arriving at Newport News Saturday morning.

The Nicaragua Canal.

The Nicaragua Canal Construction Co. has been put into the hands of a receiver, Mr. T. B. Atkins, Secretary and Treasurer of the Maritime Canal Co., of Nicaragua, being Receiver. The latter is the parent company and holds the concessions. Its officers are: Hiram Hitchcock, President, and Thomas B. Atkins, Secretary. The directors are: Hiram Hitchcock, Charles P. Daly, Horace L. Hotchkiss, Alexander I. Mason, James B. Eustis, Daniel Ammen, Alfred B. Darling, Franklin Fairbanks, C. Ridgely Goodwin, Joseph Bryan, James Roosevelt, Henry E. Howland, Horacio Guzman and Thomas B. Atkins. The officers of the Construction Co. are: Warner Miller, President; Jacob W. Miller, Secretary, and Henry B. Slaven, Treasurer. The

directors are: Warner Miller, Samuel Thomas, Stuyvesant Fish, W. Seward Webb, Smith M Weed, N. K. Fairbank, George W. Davis, J. F. O'Shaughnessy, Henry B. Slaven, Jacob W. Miller, Henry R. Hoyt, J. L. Rathbone and Gordon Macdonald.

The Train Wrecker and the Reporter.

A New Bloomfield correspondent of the Harrisburg (Pa.) *Call*, under date of Aug. 28, says: "A daring attempt to wreck two trains on the Newport & Sherman's Valley road was frustrated by the watchfulness of the engineer this morning. The scene of the villainy is at one of the numerous sharp curves east of Groff's woods, a few miles west of this place. The first train, which leaves Newport at an early hour, was steaming along at swift speed. There are numerous hills with steep ascents and descents and curves of every known degree. East of Groff's woods the curve is unusually sudden and abrupt, the train nearly doubling itself as it swings along under a full head of steam. The engineer was keeping a sharp look ahead, the iron horse snorting and puffing as it careened and plunged along. Suddenly, as the visible line of rails glittered in the morning light, there dawned a recognition of something lying across the track. The engineer was quick to act, and with the aid of the air-brakes brought the train to a standstill, being less than six feet away from the obstruction, a tie placed across the tracks. The passengers realized their narrow escape and vowed vengeance on the perpetrator. Had the miscreant been discovered the August winds would have doubtless whistled about his suspended anatomy."

Delayed Trains in France.

The French Minister of Public Works is taking a radical means for holding the French railroads up to their schedules in the movement of passenger trains. It appears that on Aug. 6, out of 323 trains arriving at the Northern station in Paris, 37 were late; but out of 775 arriving at the seven other great stations, 381 were late. The Minister looks upon this not only as an inconvenience to the public, but as an element of danger, and at the opening of the next session of Parliament he will introduce a bill levying a fine of one franc for each minute of delay of passenger trains arriving at terminal stations. The amount of the fine will be a first claim against the surplus available for dividends to stockholders.

The Chicago City Railroad Dividends.

The directors of the Chicago City Railroad Co. have declared dividends on the stock that are probably as large as were ever paid by any similar enterprise. They ordered the payment of the regular quarterly dividend of three per cent. and an extra dividend of two per cent., both in cash. In addition they voted to distribute $4,500,000 in stock of the Chicago & South Side Rapid Transit (Elevated) to stockholders and also $3,000,000 of the elevated company's bonds. The total dividend thus declared amounts to about $70 on each share.

Railroads in Siam.

The British Consul-General at Bangkok in his last report mentions that much progress was made with the construction of the Bangkok-Korat Railroad during 1892. Mr. G. Murry Campbell's tender to construct the line was accepted on Dec. 12, 1891, and the first sod was cut by the King of Siam on March 9 following. The line is 165 miles in length. It is to be equipped as a first-class line; gauge, 4 ft. 8½ in.; weight of rails, 50-lb. per yard. There are to be 183 bridges with abutments and piers of brick masonry, and superstructure of steel. They are generally of small size, crossing the numerous canals of the Menam Delta, the broadest measuring only 180 ft. The total tonnage of rails and fastenings required is 15,000 tons, and of this 11,553 tons were imported during the year. Rails are being laid at three different parts of the line. The sleepers, of which 30,000 have been delivered during the year, are of an excellent hard wood, found in abundance in the west of Siam. The labor for the earthworks is chiefly Chinese, and about 40 miles of this work has been completed during the year. The number of Chinese employed is about 2,000. The majority seek the work voluntarily, and are paid by the task. The health of the coolies has been excellent. Siamese, both men and women, are employed up-country. The contract time for completing the work is five years, but it is expected that portions of the line will be opened for traffic before the end of that date.

The meter gauge line from Bangkok to Paknam, at the mouth of the river, a distance of 14 miles, has been completed, and was formally opened on April 11 this year. The capital of the company amounts to £33,000, and of this half has been subscribed by the King. The rails are English and the locomotives and carriages German. This little pioneer line of Siam has started successfully. The Siamese take readily to this form of locomotion, and large receipts are being made from pleasure-seekers, who take trips to Paknam to enjoy the novelty of traveling by steam. The projected line across the Malay Peninsula has now been surveyed, and it is expected that the syndicate will soon begin construction on the Kedah side.

LOCOMOTIVE BUILDING.

The Great Northern has received eight of the 25 mogul locomotives, ordered some time ago from the Brooks Locomotive Works. The general details of construction of these engines are: Cylinders, 19 × 24 in., diameter of boiler, 59 in.; length of firebox, 98 in.; diameter of driving wheel centres, 48 in.; diameter over tires, 55 in.; steam pressure, 180 lbs.; weight on drivers, 99,000 lbs.; total weight, 116,000 lbs.; water capacity of tender tank, 4,000 gallons; driver and train brake, New York Air Brake Co.; tires, Krupp No. 1 steel.

CAR BUILDING.

The Carlisle Manufacturing Co. has now a number of orders on its books and will start up its shops some time this month.

The car works of Arthur King, of Middletown, Pa., are now working on an order for freight cars and cabooses for the new Wilkes Barre & Eastern Railroad in Pennsylvania.

The car works of Murray, Dougal & Co., Limited, of Milton, Pa., which give employment to nearly 800 men, started up Aug. 29. The foundry and blacksmith shops had previously resumed work.

McKee, Fuller & Co., of Catasauqua, Pa., have, it is reported, received an order for 500 freight cars for Cuba. Their mills and car shops will be started up to fill the order, giving employment to 800 men.

The Wells-French Car Co. has delivered to the Great Northern 400 Rodger ballast cars. Of these 150 are for use on the Great Northern, and the remaining 250 will be used by the Butte, Anaconda & Pacific in handling ore. They are all equipped with New York air brakes, and the Standard M. C. B. coupler.

The Haskell & Barker Car Co. has delivered to the Great Northern 550 furniture cars, and is now at work on the balance of the contract, 450 cars. These cars are 60,000 lbs. capacity; 39 ft. 6 in. long; 8 ft. 6 in. wide and 8 ft. 2 in. high inside. They are equipped with Standard M. C. B. couplers; New York Air Brake Co.'s air brakes and the Chicago grain doors.

BRIDGE BUILDING.

Brooklyn, N. Y.—The city of Brooklyn has recently placed contracts for two drawbridges. One is a duplicate of the sliding "L" street bridge, Boston, Mass., and the contract is placed with the King Bridge Co., which built the original bridge. The structure is for the crossing of the Wallabout Canal at Washington avenue. The other bridge is a plate girder span to cross the Gowanus Canal at Ninth street, and the contract has been placed with Dean & Westbrook, of New York. The Pennsylvania Steel Co. will furnish the ironwork, and the machinery of the present bridge will be used.

Catlettsburg, Ky.—The Chesapeake & Ohio Railroad bridge over the Big Sandy River at this place is making rapid progress. Work is being prosecuted day and night, and 300 men are employed. Piers Nos. 1, 2 and 3 are completed, and work on No. 4 is well under way. The piers will be ready to receive the superstructure in another month.

Delaware, Lackawanna & Western.—This road is about to place contracts for a considerable amount of bridgework, including one heavy structure of five spans.

Erie & Wyoming Valley.—This railroad company has recently placed the contract for a 600-ft. viaduct with the Union Bridge Co.

Flushing N. Y.—The new drawbridge at Flushing, Long Island, is fast approaching completion. The Berlin Iron Bridge Co., of East Berlin, Conn., which has the contract for building the bridge, has a large force of men employed finishing the draw.

Kansas City, Fort Scott & Memphis.—A contract was recently placed with the Pencoyd Iron Works for 14 single-track, deck, plate-girder bridges, varying in length from 20 ft. to 40 ft., and one half-through, plate-girder span 65 ft. long.

Kansas City, Mo.—The City and the Metropolitan Street Railroad companies have joined in the construction of a bridge over the railroad tracks at Bluff street. It will be built at a skew, 135 ft. long centre to centre of end piers, and will carry two street railroad tracks, two roadways and two sidewalks. The Missouri Valley Bridge & Iron Works, of Leavenworth, has the contract for the steelwork.

Milford, O.—The County Commissioners, Engineers and Auditors of Hamilton and Clermont counties at a joint meeting at Cincinnati, last week, awarded the contract for the substructure of the new Little Miami bridge at Milford to McDonough & Willing, the lowest bidders, for $16,500. Computation on the superstructure bids are not complete.

New York City.—The 155th Street Viaduct approach to the Central Bridge over the Harlem River has finally been completed, as far as ironwork is concerned, after being under construction nearly two years and a half. The Union Bridge Co. was the contractor for the ironwork, but was much delayed by several errors of location, accidents and difficulties attending the delivery of material owing to the construction of the Central Bridge piers.

New York, New Haven & Hartford.—Since Jan. 1, contracts for over thirty railroad bridges and nearly as many highway bridges have been let. These have been distributed among the Berlin Iron Bridge Company, Post & McCord and the R. F. Hawkins Iron Works, of Springfield, Mass. The most important structure is a four track, half through, plate girder draw span to replace the present double track crossing of the Bronx River. It is 180 ft. long with a turntable 56 ft. in diameter and two openings 60 ft. wide in the clear. This contract was placed with Post & McCord and sublet by that firm to the Passaic Rolling Mill Co., and the shopwork is now under way. Since Aug. 1, the expenses of the new construction work are being reduced.

New York, Lake Erie & Western.—Contracts for bridgework have recently been placed with the Union Bridge Co., as follows: Delaware Division, Bridge No. 6, a double track structure of three pin-connected deck spans 130 ft. long each, and two plate girder spans total weight 700 tons; Susquehanna Division Bridge, No. 69, a double track through structure of three skewed pin-connected spans, 140 ft. long each, total weight 750 tons.

New York, Susquehanna & Western.—The Passaic Rolling Mill Co. is shipping bridges for this road as fast as erection can be arranged. It has under contract the following structures:

		Length.
Bridge No.	22—Two deck plate girder spans, each.	36 ft. 3 in.
" "	23—One through Pratt truss pin span	102 ft.
" "	24— " " " " " " "	104 ft.
" "	25— " " " " " " "	102 ft.
" "	26—Two " " " " " "	104 ft. 5¾ in
" "	36—One through plate girder	84 ft. 6 in.
" "	37— " " " "	84 ft. 6 in.
" "	38— " " Pratt truss pin	103 ft.

These bridges are built of steel according to Cooper's Specifications and are all single track. The total weight of steel in the contract is 450 tons.

Oakland, N. Y.—The Wrought Iron Bridge Co., of Canton, O., has contracted to build a bridge 125 ft. long over the Neversink River at Oakland for the town of Forestburg.

Providence, R. I.—The contract for the Francis Street Bridge has been let to the R. P. Hawkins Iron Works, of Springfield, Mass. This is a plate girder structure with a heavy solid floor designed to carry a concrete roadway. Total weight of ironwork is about 300 tons.

Wheeling, W. Va.—The Edge Moor Bridge Co. has completed a new steel-girder two-span bridge over the Wheeling Creek in the yards of the Pittsburgh, Cincinnati & St. Louis Railroad in Wheeling. The bridge carries four tracks and is 70 ft. in length. It was erected in 10 days.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In the Federal Court it is held that when an order of court appointing a receiver of a railroad company provides for the delivery to such receiver of "all and every part of the properties, interest, effects, moneys, receipts, earnings," etc., such order embraces the company's seal.[1]

The W. Railway, as assignee and lessee of the M. line, held a half interest in a certain bridge. Receivers were appointed for the W. Railway and its leased lines, including the M. line, and these receivers contracted with the other half-owner of the bridge for necessary repairs thereto, agreeing to pay half the expense. The repairs were made and afterward a special receiver was appointed for the M. line. The Federal Court rules that the receivers of the W. Railway were liable, under their contract, for one-half the repairs, though, as between them and the M. line, the latter might be liable.[2]

In New York it is held by the Supreme Court that the statute which makes locomotive engineers criminally liable for failing to ring the bell or sound the whistle within 80 rods of highway crossings, does not impose a duty on the corporation itself, as was done by the act of 1854; and hence it is error to charge that the failure of an engineer to give such signals warranted a verdict in plaintiff's favor.[3]

In Minnesota it is decided that specific authority in a city charter to regulate by ordinance the speed of trains does not restrict a general grant of authority which, standing alone, would have authorized the adoption of an ordinance requiring a flagman to be kept at a crossing.[4]

Carriers of Goods and Injuries to Property.

In Texas it is held that in an action against a carrier for delay in transporting plaintiff's museum, for a certain exhibition, plaintiff cannot recover for "mental anguish" experienced because of the delay.[5]

In Texas it is held by the Supreme Court that a rule of a railroad company not to receive goods that have been damaged while in the hands of other roads, unless it is indemnified against liability for the damage, is reasonable and the company is not liable for delay where the goods of the shipper, which are not damaged are billed by mistake to another person, whose whole shipment is refused because part of it is damaged.[6]

In the same state it is held that where delay in delivery of freight was caused by atmospheric conditions, rendering the telegraphic wires unavailable, so that the employees in charge of the train could not receive orders, it was beyond the carrier's control and excusable.[7]

Injuries to Passengers, Employees and Strangers.

In Texas a railroad sold plaintiff's wife an excursion ticket, good on the return trip for three days after a certain date named. The ticket was refused by the conductor, more than the three days having expired. The ticket provided that defendant, in selling it, acted as agent and was not responsible beyond its own line. The court charged that, if the ticket was presented after the date named for its expiration it was invalid, and the conductor was justified in ejecting the holder on refusal to pay fare, unless defendant or one of the connecting lines caused the delay in presenting the ticket. The Supreme Court rules that this was error, for defendant had the right to limit its liability to its own line, but the limit fixed within which the journey must be completed must, to be binding, be a reasonable one, and whether the three days was such a reasonable time should have been submitted to the jury.[8]

In California, in an action against a street-car company for ejecting a passenger it appeared that defendant's rules required passengers to pay their fare on entering the car; that, after plaintiff had ridden about one and a half blocks without paying fare, his attention was called to the rule, and he was requested by the driver to pay, that plaintiff answered that the driver "was in too much of a hurry," and that he (plaintiff) "would take a little time on that;" that plaintiff was then ordered to get off of the car; that the driver undertook to eject plaintiff, but was himself put out by plaintiff; that the driver then seized an iron bar, and again ordered plaintiff to leave the car, which he did, without being struck or injured in any way. The Supreme Court rules that plaintiff could not recover, as his conduct amounted to a refusal to comply with a reasonable rule of defendant, and justified his removal.[9]

In Mississippi plaintiff purchased a ticket for the train known as the "Vestibule Limited" from M., in Tennessee, to C., in Mississippi, and his evidence showed that the ticket agent who sold him the ticket knew that it was to be used on the "Vestibule Limited." Defendant company showed that this train did not stop at C., which fact plaintiff knew, but there was some evidence that it was an established custom to stop this train at C. to let off a passenger holding a ticket purchased outside this state, and from the agents of some connecting railroad. The Supreme Court rules that the jury should have been permitted to say whether plaintiff had a special contract to be carried to C. on that particular train, and whether there was a custom known to the traveling public to stop there to let off foreign travelers.[10]

In New York it is held that in an action against an elevated street railroad company for injuries caused by a window of a car falling on plaintiff's finger while he was a passenger, he cannot recover, in the absence of proof that the window was raised to the proper height to be held by the catch if in proper order at the time he placed his hand in the window, and that the catch was defective.[11]

The Supreme Court of Massachuseets holds that the employees of a railroad engaged in delivering a car onto the track of another railroad company, where it is the custom to deliver cars in that way, are not on the tracks of the latter company as mere licensees.[12]

In Alabama it is laid down that it is negligence *per se* for a brakeman to jump from the pilot of a moving engine on to the track in front to attend to a switch, and evidence that it was the custom on defendant's road and other well-regulated roads for brakemen when doing switching to ride on the pilot, and to leave it in order to set a switch before the engine came to a full stop was properly excluded.[13]

The Supreme Court of Missouri holds than an experienced switchman is not guilty of contributory negligence, as matter of law, in standing near the track in front of a slowly moving engine, and in attempting to get on the footboard as the engine reaches him, where it appears that there is no rule of the company forbidding it, though done daily for eight years in the presence of the company's officers.[14]

The Supreme Court of Texas rules that running a switch engine across a public street at the rate of 15 miles an hour, and without giving signals, in violation of ordinances, is gross negligence, within the statute

making a railroad liable for the gross negligence of its servants.[15]

In Alabama it is laid down that one walking along a spur track laid on the surface of a public alley, but not imbedded so as to become part of the roadway, is a trespasser; and the railroad owes him no duty except to avoid injuring him, if possible, after his presence is discovered.[16]

In Texas the Supreme Court holds that a railroad is not liable for running over and killing a person lying asleep on its track, where its servants discovered him as soon as they could do so with reasonable care, and used all proper diligence to stop the train.[17]

In Indiana it is laid down that though a child killed by a train was a trespasser on defendant's track, it was actionable negligence for the employees in charge of the train to make no attempt to stop the train when they saw, after ringing the bell and sounding the whistle, that decedent did not understand the signals, and made no attempt to leave the track.[18]

[1] American Const. Co v. J., T. & K. W., 52 Fed. Rep., 927.
[2] Central Trust Co. v. W., St. L. & P., 52 Fed. Rep., 908.
[3] Petrie v. N. Y. C. & H. R. 21 N. Y. S., 159.
[4] Green v. East. Ry. Co., 53 N. W. Rep., 808.
[5] Yoakum v. Dunn, 21 S. W. Rep., 411.
[6] M. Pac. v. Weissman, 21 S. W. Rep., 426.
[7] Int. & G. N. v. Hynes, 21 S. W. Rep. 622.
[8] Gulf, C. & S. F. v. Wright, 21 S. W. Rep., 399.
[9] Nye v. Marasville & Y. C. St. R. Co., 32 Pac Rep, 530.
[10] Humphries v. Ill. Cen. R., 12 South Rep., 155.
[11] Voorhees v. Kings County El. R. Co, 21 N. Y. S., 175.
[12] Turner v. Boston & M. R. Co., 33 N. E. Rep, 520.
[13] Andrews v. B. M. R. Co., 14 South Rep., 432.
[14] O'Mellia v. K. C., St. J. & C. B. R. Co., 21 S. W. Rep., 503.
[15] Texas & N. O. Ry. v Brown, 21 S. W. Rep., 424.
[16] Montgomery v. Alabama G. S. R. Co., 12 South Rep., 170.
[17] Gregory v. South. Pac., 21 S. W. Rep., 417.
[18] Louisville, E. & St. L. v. Lohges, 33 N. E. Rep., 449.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on the preferred stock, payable Oct. 2.

Delaware & Hudson Canal, quarterly, 1¾ per cent., payable Sept. 15.

Little Miami, quarterly, 2 per cent., payable Oct. 2.

West Jersey, semi-annual, 3½ per cent. on the common stock, payable Sept. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual, Topeka, Kan., Oct. 26.

Chicago, Detroit & Canada Grand Trunk Junction, annual, Detroit, Mich., Sept. 27.

Chicago, Milwaukee & St. Paul, annual, Milwaukee, Wis., Sept. 20.

Florida Central & Peninsular, special, Jacksonville, Fla., Sept. 15.

Lake Erie & Western, annual, Peoria, Ill., Oct. 4.

Michigan Air Line, annual, Detroit, Mich., Sept. 27.

Louisville, New Albany & Chicago, annual, Indianapolis, Ind., Sept. 20.

New York, Ontario & Western, annual, New York City, Sept. 27.

Northern Pacific, annual, Mills Building, New York City, Oct. 19.

Prospect Park & Coney Island, annual, Brooklyn, N. Y., Sept. 18.

St. Louis Southwestern, annual, St. Louis, Mo., Oct. 3.

Toledo, St. Louis & Kansas City, annual, Toledo, O., Sept. 13.

Wabash, annual, St. Louis, Mo., Sept. 12.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Roadmasters' Association of America* will hold its annual meeting at Chicago on Sept. 12, 13 and 14. The headquarters will be at the Southern Hotel, Twenty-second street and Wabash avenue. The meetings will be held at Metcalfe Hall, No. 137 Twenty-second street. The programme of this meeting was published Aug. 18, p. 628.

The *Master Car and Locomotive Painters' Association* will hold its next annual convention at Odd Fellows' Hall, Milwaukee, Wis., Sept. 13, 14 and 15. The headquarters of the Association will be at the Kirby House, corner of Mason and Water streets. The programme of this meeting was published in our issue of July 28, p. 575.

The American Association of General Passenger and Ticket Agents will hold a semi-annual meeting at the Plankinton Hotel, Milwaukee, Wis., on Sept. 19.

The Western Railway Club meets in room 730, The Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m. The next meeting is Sep. 19.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7.30 p. m.

The Northwest Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, except June, July and August, at 8 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The Central Railway Club will meet at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of September.

New York State Street Railway Association.

The eleventh annual meeting of the New York State Street Railway Association will be held Sept. 19, at Powers' Hotel, Rochester, N. Y. The following papers will be presented at the meeting: "Recent Improvements in Cable Traction," by George W. McNulty, Engineer Broadway & Seventh Avenue Railway Co., New York, and "The Return Circuit of Electric Railways," by Thomas J. McTighe, Electrical Engineer Atlantic Avenue Railroad Co., Brooklyn. The officers of the Association are: President, C. Densmore Wyman; Vice-Presidents, Daniel B. Hasbrouck and James A. Powers; Secretary and Treasurer, William J. Richardson.

The Traveling Engineers' Association.

The annual convention will be held at Chicago, commencing Sept. 12, at 9 a. m. The Headquarters and Convention Hall will be at Hotel Hayes, corner Sixty-fourth street and Lexington avenue. Hotel rates are $1 per person for room, two in a room; meals 50 cents (European plan), American plan, $2 a day and upwards. Any one desiring to secure accommodations in advance can do so by corresponding with J. J. Leighton, 311 East Sixty-third street, Chicago. Members coming on Lake Shore, Michigan Central, Illinois Central, Baltimore & Ohio, and Pennsylvania railroads, go to Sixty-third station on Illinois Central; or take the elevated cars at foot of Congress street, and go to Lexington Avenue station (hotel is one block south).

W. O. THOMPSON, Secretary.

American Society of Civil Engineers.

At the meeting held on the evening of Wednesday, Sept. 6, 1893, the paper read at the meeting of June 21 on "Erosion of River Banks of the Mississippi and Missouri Rivers," by J. A. Ockerson, M. Am. Soc. C. E., by a vote of that meeting, came up for further discussion. A number of written discussions had been received.

At the meeting to be held on Wednesday evening, Sept. 20, 1893, a paper on "The Water Works of Denver, Col.," by James D. Schuyler, M. Am. Soc. C. E., will be read and discussed.

In common with every other branch of business, the engineering profession is beginning to feel the effects of the prevailing depression, and the Secretary is receiving applications from members for employment which he cannot furnish. If chief engineers and others having it in their power to furnish work will apply directly to him, he will be glad to furnish the names of applicants.

The French Engineers in America.

Last Sunday morning there arrived in New York a party of more than 40 members of the French Society of Civil Engineers. These gentlemen had been expected by the "eighty-niners," who had made elaborate plans for the entertainment of those who were their hosts in France four years ago.

A committee received them at the pier Sunday morning and took them to their hotel. Monday a party of about 70 met at breakfast at the Engineers' Club, and after breakfast drove through Central Park to the gate house of the new Croton aqueduct, to the Washington Bridge, the new Seventh Avenue bridge and to the central station of the General Electric Co. in Twenty-sixth street. Tuesday the party visited the Fiftieth Street power house of the Broadway cable road, examined portions of the elevated railroad and then went to the Equitable Building, where they saw the power plant, the signal station, etc., and were entertained at breakfast at the Lawyers' Club. Thence they went to the Brooklyn Bridge and to the Grand Central Station. Wednesday was devoted to water excursions and lunch at Manhattan Beach. Friday the party was to go to Niagara Falls and after a day there to proceed to Chicago. The New York Central and the Michigan Central furnished special trains without charge. From Chicago the party will go to Pittsburgh and Washington and back to New York by the Pennsylvania Railroad.

PERSONAL.

—Mr. C. H. Button, of Birmingham, Ala., has been appointed Superintendent of the Jacksonville, Mayport & Pablo Railroad, with headquarters at Jacksonville, Fla.

—Mr. G. W. Evans, who has for many years served in the capacity of General Foreman in the Richmond & Danville shops, at Atlanta, Ga., has resigned to accept a more responsible position with the Richmond Locomotive Works, of Richmond, Va.

—General Manager Henry Lambert, of the Great Western of England, with J. C. Inglis, Mechanical Superintendent, and William Dean, Superintendent of the Car Department, arrived in New York last week, and will visit a number of the principal railroads of this country.

—Mr. Stephen Little, of New York City, Comptroller of the Denver & Rio Grande Railroad, and very well known as an expert railroad accountant, is now making an examination of the accounts of the Philadelphia & Reading, representing the New York Committee of Bondholders.

—Mr. F. L. Drake, who has been General Freight and Passenger Agent of the Tennessee Midland and Paducah, Tennessee & Alabama railroads, recently resigned that position and has removed to Birmingham, Ala., to accept the position of General Sales Agent of the Virginia & Alabama Coal Company.

—Mr. John Taylor, General Traffic Manager of the Lehigh Valley, has been tendered the position in the Board of Directors made vacant by the resignation of Mr. George C. Thomas, of Drexel & Co. It is probable that he will accept, and that his election will take place at the next meeting of the board.

—The directors of the Michigan-Peninsular Car Company have promoted Mr. S. S. DeLano from Assistant Treasurer to Treasurer, vice Mr. W. K. Anderson, resigned, and Mr. Walter J. McBride from Chief Accountant to Auditor. The offices of assistant treasurer and chief accountant have been discontinued.

—Mr. W. J. Cromwell, formerly Purchasing Agent of the Philadelphia, Reading & New England, and Mr. H. W. Watson, formerly Auditor of the same road, before the operation of the line was assumed by the Philadelphia & Reading, have been reappointed to those positions by the Receiver, J. K. O. Sherwood.

—Mr. Henry D. Ellis has resigned his position as General Agent of the Kansas City, Birmingham & Memphis road, and will be succeeded by Mr. John A. Scott, who resigned the position of District Passenger Agent of the Louisville & Nashville to accept the vacancy on Sept. 1. Mr. Scott has been with the Louisville & Nashville about 13 years.

—Mr. J. C. Morrison, who was formerly Purchasing Agent of the St. Paul, Minneapolis & Manitoba and continued in that position when the road became the Great Northern, has been appointed Chief Clerk in the motive power department of the same road. Since Mr. Morrison resigned the position of Purchasing Agent he has been on leave of absence.

—Mr. E. W. How, who has been Commissioner of the Mexican Freight Association, which comprises the three or four most important railroads in Mexico, has resigned that position, which he has held for about a year, to become General Agent of the Mexican (Vera Cruz) Railroad in the United States. His office will probably be in New York City.

—The office of Assistant General Freight Agent of the New York, Lake Erie & Western, at Buffalo, N. Y., was abolished this week. Mr. Joseph Deuel, who has held that office for over three years, has been appointed Division Freight Agent. Other changes have been made in the traffic department of the company, and its present organization is given in another column.

—Mr. A. M. Morey, Superintendent of the St. Joseph & Grand Island road, has resigned, his health being so poor that he is not able to give close attention to the duties of the office. He has been transferred to be Superintendent of Telegraph of the railroad. Mr. C. W. Card, who has been Trainmaster on the Chicago Division of the Chicago, Burlington & Quincy, at Aurora, Ill., has been appointed Superintendent of the road.

—Mr. Charles D. Lee has been appointed General Passenger Agent for the Lehigh Valley Railroad, with headquarters in Philadelphia. Mr. Lee held a similar position with the Colorado Midland until it was absorbed by the Atchison, Topeka & Santa Fe, having been appointed to that position when the road was opened. Before that time he was Assistant Passenger Agent for the Denver & Rio Grande for years.

—Mr. W. W. Reynolds, Master Mechanic of the Panhandle shops at Logansport, Ind., has been recently transferred to Columbus, O., as assistant to Mr. S. P. Bush, Acting Superintendent of Motive Power of the Pittsburgh, Cincinnati, Chicago & St. Louis. Mr. W. C. Pennock, who has been Master Mechanic of the Cincinnati Division of the road, has been transferred to the Chicago Division to succeed Mr. Reynolds as Master Mechanic at Logansport.

—Mr. Thomas Hyman, who has been Assistant to President Hill, of the Great Northern, resigned this week to take effect Sept. 30, and it is announced that the office will then be abolished, at least temporarily. Mr. Hyman was appointed Assistant to the President of the Great Northern in March, 1892. He had previously been Auditor of the Wisconsin Central until that road was leased to the Northern Pacific and the Auditor's office removed to Chicago.

—Mr. G. H. Thomson, Engineer of Bridges of the New York Central & Hudson Railroad, is soon to close his 20 years' service with that company, to enter into business as Consulting Engineer with main office at New York City. He is now consulting bridge engineer to several railroads, and is open to further engagements for the design and construction of structures. Mr. Thomson is a member of the American Society of Civil Engineers, and of the Institution of Civil Engineers (England).

—The formal announcement of the appointment of Mr. J. H. Heckman to be General Passenger Agent of the Lehigh Valley was issued last week by General Traffic Manager Taylor. Mr. Heckman was formerly General Freight Agent of the Lehigh Valley, having been appointed to that position in 1881. When the lease to the Philadelphia & Reading was made he became Assistant General Freight Agent of that company, having charge of the traffic on the Lehigh Valley lines.

—Mr. I. E. Umstead, General Superintendent of the Delaware, Susquehanna & Schuykill Railroad, has resigned. He had held the position of Superintendent ever since the road was constructed in 1891. Mr. Daniel Coxe, of Drifton, Pa., has been appointed to succeed Mr. Umstead, and H. J. Davis is the new Assistant Superintendent. The position of Superintendent of Motive Power, which Mr. Coxe formerly held, has been abolished, and A. J. Beltz has been made head of the mechanical department.

—Mr. Ernest V. Clemens, 38 years old, died at his home in New York City on Sept. 3. He was the son of A. B. Clemens, manager of the White Cloud Mining Company, of Clemens, Neb., and was himself a Mechanical Engineer. He was born in Waterbury, Conn., but came to New York five years ago to become Superintendent of the De La Vergne Refrigerating Company at Port Morris. He held this office at the time of his death. He was a member of the American Society of Mechanical Engineers and of other engineering societies.

—Mr. John D. Farrell has been appointed Assistant General Superintendent of the Western Division of the Great Northern, with headquarters at Spokane, Wash. Mr. Farrell entered the railroad service as a track laborer on the Chicago & Northwestern in 1877. In 1879 and 1880 he was timekeeper and foreman of material yard of the bridge and building department of the Southern Minnesota Division of the Chicago, Milwaukee & St. Paul and in 1881 was foreman of bridge construction, for the Chicago & Northwestern in Dakota. From December, 1881, to July, 1882, he was bridge foreman of the Southern Minnesota Division of the Chicago, Milwaukee & St. Paul. From July, 1882, to May, 1883, he was Chief Clerk of the bridge, building and water department of the Canadian Pacific, with headquarters at Winnipeg, Man., and from May, 1883, to August, 1884, was Assistant Superintendent of the same department. From that time until March, 1888, he filled various positions in the train service of the St. Paul, Minneapolis & Manitoba and Chicago, St. Paul & Kansas City roads. From March 1888, to September, 1889, he was trainmaster of the Chicago Division of the latter road, and until June, 1892, was Superintendent of the Chicago Division. He was then appointed Superintendent of the Cascade Division of the Great Northern, and is now promoted to be Assistant General Superintendent of the Western Division of the same road, with jurisdiction from Minot, N. D., to Puget Sound.

ELECTIONS AND APPOINTMENTS.

Altoona, Clearfield & Northern.—The following have been recognized by the courts to be the legal directors of the company: William Loudon, John Loudon, John A. Canan, George S. Adams, W. S. Lee, S. J. Westley, Andrew Kipple, William Findley, M. H. Mackey, George F. Jackson and Charles Baltzell.

Cleveland, Cincinnati, Chicago & St. Louis.—President M. E. Ingalls this week issued the official notice of the appointment of E. O. McCormick to be Passenger Traffic Manager of the lines of this company, in charge of the passenger business, reporting to the President. The appointment is effective from Sept. 1, 1893.

Chicago & Northwestern.—The following appointments for the Ashland Division of the road, formerly the Milwaukee, Lake Shore & Western, have been officially announced: Superintendent, George F. Bidwell, with headquarters at Kaukauna, Wis.; Assistant Superintendent, C. H. Hartley, with headquarters at Ashland; Master Mechanic, Robert Quayle, with headquarters at Kaukauna; Division Engineer, E. H. Rummele, with headquarters at Kaukauna.

Great Northern.—John D. Farrell has been appointed Assistant General Superintendent of the Western Division, with headquarters at Spokane, Wash., vice C. Shields, resigned to become General Superintendent of the Chicago Great Western.

J. C. Morrison has been appointed Chief Clerk in the motive power department.

Milwaukee & Northern.—A meeting was held at Milwaukee, Wis., on Aug. 28 and the following directors elected: Henry C. Payne, P. M. Myers, J. J. Coleman, H. C. Haughan and Angus Smith, Milwaukee; Roswell Miller and E. P. Ripley, Chicago. The directors then elected Henry C. Payne, President; Roswell Miller, Vice-President; P. M. Myers, Secretary, and F. G. Ranney, Treasurer. This road is now practically an integral part of the Chicago, Milwaukee & St. Paul.

New York, Lake Erie & Western.—The freight department has been reorganized and the following appointments made: J. Deuel, appointed Division Freight Agent with office at Buffalo, N. Y., in charge of freight traffic at Buffalo, and on the Niagara Falls and Lockport branches. The office of Assistant General Freight Agent at Buffalo has been abolished. J. M. Horton, Division Freight Agent, Rochester; W. C. Buck, Division Freight Agent, Elmira, N. Y.; R. M. Parker, Division Freight Agent, New York City; H. C. Barlow, Division Freight Agent, Bradford, Pa. All division freight agents will report direct to the General Freight Agent. This is practically the same as the force is organized at present, except that the office of assistant general freight agent at Buffalo is abolished.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Addison & Pennsylvania.—The work of changing the gauge of this line from 3 ft. to standard is now about completed between Addison, N. Y., and Galeton, Pa., 46 miles, and Mr. F. M. Baker, the General Superintendent, expected to run the first standard gauge train over the entire road some day this week.

Akron & Eastern.—Bennage & Averall, who have a contract on this road, last week filed a petition for the appointment of a Receiver. The road is an extension of the Pittsburgh, Akron & Western, which was recently placed in the control of a Receiver. The new road was to extend from Akron east to Newcastle, Pa., about 70 miles. The location had been made, the grading begun near Akron and a short section of the line near that city about completed.

Bayfield, Lake Shore & Western.—It is probable that the grading of the first 20 miles of this road will be done this fall. The town of Bayfield, Wis., in April last voted bonds in the sum of $50,000 to aid in the construction of the first 20 miles conditioned upon that portion of the road being completed ready for operation within one year. As this is the second time bonds have been voted in aid of this enterprise it is not likely that they will be renewed, but that some other company will seek to obtain the aid should the bonus be permitted to lapse. A survey of another route to Siskiwit Lake, extending from Pike's Bay up Pike's Creek, has already been made and the route is said to be more feasible than the present one. From Siskiwit Lake the original route would be followed to Iron River to a junction with the Northern Pacific and Duluth, South Shore & Atlantic roads. This route is reported to have light grades and to be 38 miles in length, from Chequamegon Bay to Iron River as against 50 miles for the original route.

Cheat River.—This company, which was chartered in West Virginia on July 15, held its first meeting of stockholders at the office of J. B. Dillie, in Morgantown, W. Va., on last Saturday for the purpose of organizing. W. S. Guffy, George Heard, Emmet Queen, and W. F. Johnson, of Pittsburgh, and George D. Prentice of Allegheny, Pa., were elected directors. The directors chose W. S. Guffy, President; Emmett Queen, Vice-President; W. F. Johnson, Secretary; and George Heard, Treasurer. The permanent office of the company was fixed at No. 43 Sixth avenue, Pittsburgh, Pa. A favorable report was received from the engineers who have made a preliminary survey of the proposed line. The route which has been gone over is from a connection with the Pittsburgh, Morgantown & Fairmont Railroad, on the Monongahela River, four miles from the mouth of the Cheat River, and 14 miles north of Morgantown. It follows the Monongahela and Cheat Rivers to Rowlesburg, W. Va., to a connection with the main line of the Baltimore & Ohio, a distance of 50 miles. The line passes through one of the finest undeveloped sections of West Virginia. The Connellsville coking coal seams extend through the valley, besides the Preston basin coal. The section was, in 1840, noted for its iron production, there being 20 abandoned furnaces along the route which smelted the native ore before there were any railroads in that section.

Chicago, Superior & Pacific.—W. R. Chadsey is the chief projector of this road, which was chartered in Wisconsin this week. The route outlined in the charter is from the Illinois state line northwest to Superior City. Part of this route was graded many years ago, and a number of companies have been organized at various times to complete the construction work, the Chicago, Portage & Superior being one of these. None of these companies has ever done any actual construction work.

Dakota & Gulf.—Press dispatches report that a charter for this road was filed at Topeka, Kan., last week. The incorporation was secured to carry out some resolution of a recent convention held at Lincoln, Neb., attended by delegates appointed by the Governors of various Western states. The delegates resolved that a new "South and North" railroad line from Dakota to Texas was one of the immediate needs of the country west of the Mississippi, and the project has advanced far enough to have the charter taken out.

The headquarters of the company are to be at Wichita, Kan., and the incorporaters are: G. W. Clement, E. R. Powell, P. K. McLean and W. B. Cook, of Wichita; C. M. Rawlings, of Lyons; O. H. Violet, of Oklahoma City, and Edward Romer, of New York City.

Denver & Rio Grande.—President Jeffery and a party of the company's officials made an inspection trip over the New Ruby-Anthracite coal branch on Aug. 29, and the line has now been opened for regular traffic. It is 11 miles long, extending from Crested Butte, Colo., to the mines of the Colorado Fuel Co., at Ruby-Anthracite, where a large anthracite coal breaker is now being built at a cost of $100,000. The stations are Elk Creek, Irwin, Kebler Divide and Ruby-Anthracite. The work is now practically completed except the building of side tracks and snowsheds.

Elkhart & Western.—The tracklaying was completed into Elkhart, Ind., on Aug. 27, and trains are now running over the line from Mishawaka east to Elkhart, a distance of 11 miles. It is proposed to extend the road west to South Bend, Ind. The road between these three towns is parallel to the Lake Shore & Michigan Southern. The new line is being built largely by H. E. Bucklen, of Chicago, who is President of the railroad. E. C. Bickel, of Elkhart, is General Manager.

Gulf, Beaumont & Kansas City.—Excursion trains have been run on the first 10 miles of this new road beyond Beaumont, Tex., to Pine Island Bayou. The track has been laid for about 15 miles north of the city, about a mile of the rails being laid daily. Downey & Bro., of Houston, who have the contract for building the first 21 miles of the road, expect to complete their work by Oct. 1. J. H. Kirby, of Houston, the General Manager, expects to arrange by that time to let additional contracts.

Hudson River Terminal & Improvement Co.—This extension of the New York, Susquehanna & Western, although only about four miles long, has on its line the important tunnel under the Palisades, opposite Seventy-second street, New York, already described in these columns, and contracts have recently been placed for bridge work as follows: The crossing of the New York, Susquehanna & Western, and the West Shore railroads which is a through, pin-connected structure of two double-track spans each 115 ft. 6 in. long, c. to c. The Passaic Rolling Mill Co. has the contract and is now nearly through with the erection. The crossing of the Northern Railroad of New Jersey, which is an 80-ft. half through, double-track skew, plate girder. The Bellmans Creek draw, a 63-ft. double-track deck, lattice girder span, which opens on the "jack-knife" principle, and when open is supported by inclined posts turning on pivots. These contracts, together with that for a 24-ft. double-track plate girder span has been let to the Edge Moor Bridge Works.

Norfolk & Western.—This company's Dingess branch, on the Ohio River extension, is ready for the rails for four miles, and it is proposed to extend it a mile further to reach the Pearl Coal Company's mines. The entire line will be completed by Oct. 1.

Philadelphia & Delaware County.—The construction work on this branch of the Pennsylvania, which was begun in July, is proceeding very slowly, the contractor retaining only about a third of the number employed when the work was started. The branch leaves the Pennsylvania near Fernwood Station, on the West Chester road, and extends to Newtown Square, Pa., 10 miles. There are many deep cuts and heavy fills on the line, and it will be impossible to have the line finished by Jan. 1 as was first expected. By the agreement between the Pennsylvania Railroad and interested property-owners, who subscribed $100,000 toward the building of the road, it is to be in operation by July 1, 1894, and there will be no difficulty in completing it by that time. The road will be unusually expensive, because of the broken country through which it extends, necessitating a number of bridges over Darby Creek and its tributaries, and many rock cuttings.

Pittsburgh, Morgantown & Fairmont.—The tracklaying is completed to within a mile of Point Marion on the Pennsylvania end, and the rails will reach the Cheat River this week. On the Morgantown end the track is within five miles of Cheat River. Word has been received from the shops that the 700-ft. bridge which is to span the Cheat River is completed and will be shipped as soon as the tracklaying reaches the river. It will take about 40 days to put the superstructure in place, the foundations being completed. The road will be opened for traffic some time in October.

Roaring Creek.—The work of grading this railroad in West Virginia has been commenced. A small force of men began the work on Aug. 25, and a force of 200 went to work on Sept. 1. The road is to be built from Elkins, W. Va., to the headquarters of Roaring Creek. The surveys have been made by John W. Moore.

Sioux Falls, Yankton & Southwestern.—An account of the work now being done on this road reports that the construction work is more than half finished. The rails have been laid 32 miles west of Sioux Falls, S. D., and are now being put down at the rate of two miles a day. The first train is expected to reach Yankton this week. Stations, grain elevators and side tracks are now being constructed. Including Sioux Falls and Yankton, there are 10 stations on the line: Mission Hill, six miles from Yankton; Volin, 12 miles; Irene, 21 miles; Niborg, 28 miles; Davis, 36 miles; Lennox, 45 miles; Byron, 51 miles; Sioux Falls, 62 miles. This is the road in which United States Senator R. F. Pettigrew is the chief stockholder and President.

Texas & Gulf.—L. W. Lloyd, of Marshall, Tex., Vice-President of the road, reports that a contract has been agreed upon with W. L. Bennett, of New York City, for the construction of 60 miles of the road from Marshall south to Center, Tex., about 60 miles. It is said that the work is to be commenced in September, but probably only enough work will be done at present to comply with the terms of the subsidies voted by the towns along the line. About 16 miles of the road from Marshall, Tex., is already graded, the work having been done under a former contract.

Toledo & Ohio Central.—Work on the Belt Line at Columbus, O., being built by this company, is progressing, grading being well under way. The company, it is said, has secured a site on West Broad street near the Scioto River bridge, for a freight and passenger station in Columbus.

Union Pacific.—The new terminals at Boise City, Idaho, for the Boise branch of the Oregon Short Line Division, have been completed and the trains are now running to the new station in the city limits of the city, about a mile beyond the old station on the bluffs on the south side of the Boise River. The terminals were built by the Boise Railway & Terminal Co. They include about six miles of new railroad, a 300 ft. bridge across the Boise River and the new stations in the city of Boise, which are now building.

Wheeling Bridge & Terminal Railway Co.—This company's Benwood extension will be ready to open for traffic within two weeks. Work has been pushed with all possible vigor for the past two weeks, to get the road open by the time the mills at Benwood are ready to resume. Work is to be commenced upon the connection with the Pittsburgh, Cincinnati, Chicago & St. Louis road as soon as the Benwood extension is completed.

GENERAL RAILROAD NEWS.

Altoona, Clearfield & Northern.—The contest between the two boards of directors elected last February for the control of this road has been finally decided in favor of the directors elected in the interest of S. P. Langdon, of Philadelphia, and against F. G. Patterson, the president of the company. The court has ordered the Patterson interest to surrender the company's property to S. P. Langdon, who is declared to have been elected president at the meeting in February last. Mr. Langdon and his directors are now in possession of the railroad, and will continue its operation.

Atchison, Topeka & Santa Fe.—The comparative statement of operations for the month of July follows:

Month of July:	1893.	1892.	Inc. or dec.
Operated mileage	7,480	7,480	.....
Gross earn	$3,008,322	$3,267,228	D. $258,906
Oper. expen	2,129,772	2,253,695	D. 123,923
Net earn	$878,550	$1,013,533	D. $134,983
Other receipts	75,000	75,000	.....
Total net earn	$953,550	$1,088,533	D. $134,983
One-twelfth fixed charges	942,000	919,000	I. 23,000
Surplus	$11,550	$169,533	D. $157,983

The report for the entire system, including the earnings of the St. Louis & San Francisco, is given in the following table:

Month of July:			
Operated mileage	9,344	9,344	.....
Gross earn	$3,727,672	$4,018,046	D. $290,374
Oper. expen	2,597,910	2,720,693	D. 122,783
Net earn	$1,129,762	$1,297,353	D. $167,591
Other receipts	75,000	75,000	.....
Total net earn	$1,204,761	$1,372,352	D. $167,591
One-twelfth fixed charges	1,227,000	1,191,000	I. 33,000
Surplus	Def. $22,239	$178,352	D. $200,591

Carthage, Watertown & Sacketts Harbor.—The New York Central & Hudson River Railroad Company has accepted an option offered by the Railroad Commissioners of the town of Watertown, N. Y., on the $300,000 of stock held by that town in the above railroad company, for the purchase of the stock at par. It is provided that the company will purchase the remaining $165,000 worth of stock held by other towns and individuals at the same price. This will make the New York Central the owner instead of the lessee of the road, and will relieve the towns of all indebtedness and obligations.

Canadian Pacific.—The earnings for July and the fiscal year to date are reported in the following table:

Month of July:	1893.	1892.	Inc. or Dec.
Gross earn	$1,853,267	$1,796,095	I. $57,172
Operating expen	1,172,330	1,114,152	I. 58,178
Net earn	$680,937	$681,943	I. $8,994
Seven months to July 31:			
Gross earn	$11,323,264	$11,618,584	D. $295,320
Operating expen	7,563,057	7,614,157	D. 51,100
Net earn	$3,760,207	$4,004,427	D. $244,220

Eatonton Branch.—Receiver Comer, of the Central of Georgia, which company has operated this road for many years, has decided to surrender the lease, and the property has been transferred back to the stockholders. A temporary agreement has been made for the operation of the line by the Middle Georgia & Atlantic, with which it connects at Eatonton. The road is 21 miles long and connects Eatonton, Ga., with Milledgeville and Gordon. The Middle Georgia & Atlantic is now operating 45 miles of road from Eatonton to near Covington, Ga.

Galveston, Houston & Henderson.—The Missouri, Kansas & Texas has won the case against the International & Great Northern, which has been argued for the past two weeks in the District Court of Texas, at Galveston, Tex. The decision declares that the recent contract made by the Missouri, Kansas & Texas, providing for the running of its trains over the tracks of the above road from Houston to Galveston, is valid, and a permanent injunction is granted preventing the International & Great Northern from interfering with this traffic. The International & Great Northern is to continue to use the tracks as heretofore and is to continue in control of the road. The decision does not seem to touch the validity of that company's lease of the Galveston, Houston & Henderson made in 1883, which was one of the main points at issue. When the Galveston, Houston & Henderson was leased to the International & Great Northern, the Missouri, Kansas & Texas was a part of the Missouri Pacific system. Though owning nearly the entire capital stock of that road, it has had no connection with the line until it built its branch into Houston, which was completed this year. The International & Great Northern refusing to permit it to run its through trains to Galveston, a lease was made with the Galveston, Houston & Henderson, and a temporary injunction was at once secured to prevent the International & Great Northern from obstructing the running of trains under the new lease. The motion to make this injunction permanent is decided in favor of the Missouri, Kansas & Texas. The company's trains are now running over the road between Houston and Galveston.

Indianapolis, Decatur & Western.—The committee of bondholders has obtained from the court in Indianapolis an extension for six months of the time in which to take title to the property bought May 3 (the Indianapolis, Decatur & Springfield Railroad). It is hoped the time allowed will afford opportunity for a satisfactory adjustment of all interests. The lease to the Cincinnati, Hamilton & Dayton will also doubtless be arranged for within the time granted by the court.

Lehigh Valley.—Since the lease to the Philadelphia & Reading was abrogated and the company assumed the operation of its own lines, reports have been circulated in New York that the railroad was intending to increase its floating debt by $2,000,000. John B. Garrett, the Third Vice-President, has written a letter to a New York banker denying these reports. He says that the company has no pending applications for loans. "The report has probably its basis in this: The individual operators whose contracts lapsed by cancellation of lease desire the Lehigh Valley Coal Co. to revive them. We decline, unless they furnish for five or seven years the capital required to conduct the business, estimated at about two millions. They may have asked such a loan on pledge of Lehigh Valley securities, but only on their own note or other negotiable obligation. We have steadfastly declined to add to our floating debt for this purpose." The amount of floating debt, he adds, is $3,500,000, and amply secured by collateral. Mr. Garrett's reply also gives to the public the present status of the negotiations between the individual operators and the Lehigh Valley Coal Co. This briefly summarized is that the Lehigh Valley Coal Co. has consented to continue temporarily the old contracts which lapsed by the cancellation of the Lehigh Valley-Reading lease

and has refused to continue these contracts permanently. All other questions between the operators and the coal company remain undetermined.

Louisville, New Albany & Chicago.—The proposal for the classification of the stock of this company having been accepted by a majority of its stockholders, the directors have declared the plan operative, and have fixed Sept. 30 next as the time when the privilege of depositing stock with the Central Trust Co. will cease under the terms of the circular of March 7, 1893. The $12,000,000 of stock will be classified into $9,000,000 of new common and $3,000,000 preferred, the latter being entitled to six per cent. dividends, if earned.

Northern Pacific.—The petition of the receivers for authority to issue receivers' certificates to the amount of $5,000,000 to redeem about $6,182,867 worth of stocks and bonds held as collateral to secure the floating indebtedness of the road was granted this week in the United States Circuit Court at Milwaukee, before Judge Jenkins. The certificates will bear six per cent. interest and will run for one year. They are to be used solely to redeem the securities held against the floating debt, and will be secured by the collateral when redeemed as well as by the income of the road. Some of the bond-holders have objected to the issue of receivers' certificates, for the purpose named in the application to the court, on the ground that it would be a prior lien to the bonds. W. N. Cromwell, attorney for the receivers, in replying to these criticisms, says that the issue of certificates by the receivers, will in no respect injure the interests of bondholders. The proposition now considered, which will be submitted to the court, is that the receivers' certificates shall be secured by redemptions which shall furnish a collateral far in excess of the face value of the certificates. This will minimize the encroachments upon the lines of the bondholders, and secure to the railroad corporation a large equity in the securities to be redeemed.

Philadelphia & Reading.—President Harris gives official notice that an arrangement has been made with Drexel & Co. and Brown Brothers & Co., of Philadelphia, to purchase the company's 7 per cent. bonds of 1893 from the holders at par on their maturity Oct. 1, 1893, and to extend them as gold bonds for 40 years at 5 per cent. interest.

South Jersey.—The installment of $62,500 of the purchase money due from the railroad to the West Jersey which was the cause of a recent suit begun by the latter company, has been paid over by Vice-President Logan M. Bullitt, and the final installment of $62,500, completing the $200,000 paid for the road, will also be forthcoming when due, it is stated. It is the intention of the company to proceed with the construction of the lines to Cape May and Ocean City, N. J., and complete them in time for next season's business. The South Jersey Railroad has been formed by the consolidation of the Winslow & Richland, the Richland & Petersburg, and the Petersburg & Sea Isle roads, which were purchased by the West Jersey in March, 1892, at receiver's sale, and were at the time of the sale known as the Philadelphia & Sea Shore road.

On July 1, 1893, the South Jersey company purchased these lines from the West Jersey, and now operates a line from Philadelphia to Sea Isle City, N. J. (63.6 miles), having trackage rights over the Atlantic City (Philadelphia & Reading) from Kaighns Point to Winslow Junction (a distance of 24.5 miles), and using its own rails from Winslow Junction to Sea Isle City, a distance of 39 miles. The bonded indebtedness of the road is $500,000, and the capital stock is $540,000. The principal office is at 333 Bullitt Building, Philadelphia. Logan M. Bullitt, of Philadelphia, is Vice-President, and James E. Taylor is General Manager.

Tamaqua, Hazleton & Northern.—It is announced that this branch of the Philadelphia & Reading, which was built in 1891, when the company made a contract to carry the coal traffic of Coxe Bros. & Co. to tidewater, is to be abandoned as a result of the abrogation of the Coxe contract by the Philadelphia & Reading Receivers. The road is about 10 miles long from Lofty Station, on the Catawissa Division, north to Roan, connecting with the Drifton, Susquehanna & Schuylkill road, which is owned by the firm of Coxe Bros. & Co.

Toledo, Ann Arbor & North Michigan.—The Central Trust Co., which is trustee of the bonds authorized in January, 1890, amounting to $10,000,000, began an action last week in the District Court of Ohio for the discharge of the present Receiver and the appointment of a new receiver to represent its interests and the bondholders who have asked that this action be brought. The Receiver now in possession is Wellington R. Burt, a son-in-law of President J. M. Ashley, of Toledo. The appointment was made in April, 1893, in a suit brought by the Craig Shipbuilding Co., of Toledo. Vice-President J. M. Ashley, Jr., speaking of the suit begun by the Central Trust Co., says that under an agreement in the mortgage, proceedings for foreclosure can only begin six months after default has been declared, and the default only occurred in July last. Mr. Ashley also says that a reorganization committee, which will conclude its labors about the middle of October, has been planning a new organization which will doubtless be acceptable to all parties and to all interests. This Committee is practically in charge of affairs. It represents two-thirds of the bondholders and stockholders and will make friendly arrangements with the creditors. The cause of action will not accrue until after Jan 1, and by that time the new organization will probably be arranged.

Union Pacific.—A syndicate has been formed by Vermilye & Co., of New York, to underwrite the extension of the Union Pacific sinking fund 8 per cent. bonds which matured Sept. 1. The offer of the Union Pacific company to extend bonds is limited to $3,800,000, of which amount more than $2,000,000 have already assented to the extension. The Union Trust Co. will purchase the balance of $1,800,000 from such bondholders as may prefer not to extend their bonds. After bonds to the amount of $3,800,000 have been extended or bought, the balance outstanding, amounting to some $1,400,000, will be paid out of the land funds applicable to that purpose, and the bonds cancelled.

Velasco Terminal.—W. M. D. Lee, General Manager of the company, denies the current report that this road now operated between Chenango Junction and Velasco, Tex., has been leased by the International & Great Northern, or is to be operated by that company.

TRAFFIC.

Traffic Notes.

The Louisville & Nashville has been carrying some pig iron from Anniston, Ala., to New Orleans for export to England.

The Burlington, Cedar Rapids & Northern began charging demurrage on freight cars Sept. 1. The rate is $1 a day.

The Railroad Commissioners of Missouri have this week held hearings on the subject of revising the transportation rates of the express companies, in accordance with the law recently passed.

The New Orleans Freight Bureau has been put in operation, with W. H. Masters, Commissioner. Mr. Masters was General Freight Agent of the Gulf, Colorado & Santa Fe previous to May 1. It is understood that his salary will be $4.000 a year.

The Erie took 575 passengers out of New York on its day-car excursion to the World's Fair last Saturday. Additional passengers were taken on at points east of Salamanca and on the Buffalo & Southwestern enough to make up a total of nearly 2,000 into Chicago. Since Sept. 1 travel of all classes from the East to the World's Fair has been heavy. The Exposition Flyer of the New York Central took 101 passengers out of New York last Saturday.

The suit of the Interstate Commerce Commission against the New York, Philadelphia & Norfolk has been dismissed by the United States Court at Norfolk, Va. This suit was brought, we believe, to enforce the order of the Commission directing the road to reduce rates on shipments of fruit to New York from points on the line of the road, these rates having been alleged to be unduly high in proportion to the rates from Norfolk to New York on similar goods.

Chicago Traffic Matters.

CHICAGO, Ill., Sept. 6, 1893.

Both the Western Freight Association and Central Traffic Association lines are very much exercised over the cuts in lake and rail rates which have been made during the past few days. The agreed differential in favor of the lake and rail lines is five cents per 100 lbs. From both Lake Michigan and Lake Superior ports rates as low as 12½ cents per 100 lbs. lake and rail are freely quoted on 6th class and 17½ cents on 5th class. On Sept. 4 rates on flour were made from Minneapolis to New York via Milwaukee or Chicago at 22½ cents per 100 lbs., the agreed rate being 35 cents. The Soo line announced on Monday a rate on flour from Minneapolis of 20 cents per 100 lbs., all rail, and 17½ cents per 100 lbs., lake and rail, to New York. The demoralization is apparently complete. Chairman Midgley last week addressed a lengthy communication to the lines in his association, presenting the situation and showing that reduced rates have been made from Minneapolis for practically every shipment of any considerable quantity, the rate varying from day to day and shipment to shipment. The Western lines are charging the Trunk lines with bad faith in refusing to either prorate with them in meeting the reductions, or in refusing to prorate with the lake and rail lines on rates which disregard the established differential. The Chicago eastbound roads have formally protested against the action of the lake and rail lines, and upon their vote Commissioner Blanchard has addressed a communication to the Commissioner of the Trunk lines asking him to bring about a restoration of rates. An attempt was made to pass a resolution to request the joint committee to at once authorize such reductions in the all rail rates as would preserve the differential of five cents, but the majority of the lines were averse to adopting such a motion.

Representatives of the Southwestern lines, after discussing the situation for several days, came to the conclusion that nothing except a compromise would secure the requisite signatures for the adoption of the proposed agreement for the new association, and secure the co-operation of the Rock Island and the consequent withdrawal of the notice of the Santa Fe. The whole matter was finally referred to a special committee, who reported in favor of extending the St. Louis basis of rates to the banks of the Mississippi River, to include Rock Island, Moline and Davenport. This report was adopted, and the Rock Island agreed to join the association and the Santa Fe withdrew its notice of withdrawal. It is now probable that a meeting will be called at an early day to perfect the formation of the new association.

The Western lines are now at liberty to run special World's Fair day-car excursions at any time for half fare upon giving notice through the Western Passenger Association of their intention to do so. All the Eastern lines are now bringing in large excursions.

The Burlington and the Green Bay, Winona & St. Paul have agreed to reduce the freight rates between Winona and Merrillon Junction to a rate which will enable the Minneapolis jobbers to compete with Chicago in this territory.

The proposed Trans-Continental meeting is "off." Neither the Canadian Pacific nor the Southern Pacific was ready to attend a meeting, and no further effort will be made for the present to bring about the formation of another Trans-Continental Association.

Lines in the Central Traffic Association have agreed not to run Niagara Falls excursions this year at less than the regular tourist rates, nor to permit their lines to be used by other companies for that purpose. The action does not prevent the Grand Trunk, Michigan Central and Wabash from running such excursions east of London and St. Thomas, nor the Lake Shore, Nickel Plate and Erie on and east of a line drawn from Meadville to Erie, via the Pittsburgh, Shenango & Lake Erie.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending Sept. 2 amounted to 50,149 tons, against 43,992 tons during the preceding week, an increase of 6,157 tons, and against 59,018 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to Sept. 2		W'k to Aug. 26.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	7,007	14.0	5,697	13.0
Wabash	4,065	8.1	3,022	6.9
Lake Shore & Michigan South.	6,819	13.6	5,950	13.5
Pitts., Ft. Wayne & Chicago..	5,516	11.0	4,874	11.1
Pitts., Cin., Chicago & St. Louis	6,735	13.4	6,143	14.0
Baltimore & Ohio	2,652	5.3	2,685	6.1
Chicago & Grand Trunk	4,000	8.0	3,852	8.8
New York, Chic. & St. Louis...	5,128	10.2	4,500	10.2
Chicago & Erie	6,004	12.0	5,453	12.4
C., C., C. & St. Louis	2,223	4.4	1,816	4.0
Totals	50,149	100.0	43,992	100.0

Of the above shipments 1,255 tons were flour, 18,285 tons grain and millstuff, 10,143 tons cured meats, 11,968 tons dressed beef, 1,259 tons butter, 1,311 tons hides and 3,863 tons lumber. The three Vanderbilt lines carried 37.8 per cent., the two Pennsylvania lines 24.4 per cent. The Lake lines carried 80.746 tons, against 72,163 tons during the preceding week, an increase of 8,583 tons.

The last week in August shows increased freight traffic on the Western roads. Every road made good gains in all directions. The receipts of grain at Chicago by 12 granger roads aggregated 5,919,000 bus. for the week, an increase of 1,066,000 over the week ending Aug. 26. The present month will probably be good, but can hardly be expected to reach the heavy volume of September, 1892.

The arbitrary rulings of the Kansas Railroad Commissioners have compelled the railroads to bill live stock at so much per carload. This works a great injustice to the roads, as the cars have been increasing in size, yet the Commissioners made no allowance for that. Recently, however, the Kansas Commissioners have signified a willingness to adopt the rules in force in other states; if they do so it will make a very material difference in favor of the roads.

The following table exhibits the deliveries of flour and grain at Chicago by 12 granger railroads during the week ending Sept. 2, and for the same time in 1892, also the amount brought by each road:

By—	1893.		1892.	
	Flour.	Grain.	Flour.	Grain.
	Bbls.	Bush.	Bbls.	Bush.
C. N. W.	13,716	777,000	10,333	828,000
Ill. Cent.	750	926,000	260	1,034,000
C., R. I. & P.	8,400	829,000	3,750	826,000
C., B. & Q.	9,196	1,517,000	20,313	1,522,000
C. & Alton	8,400	340,000	16,350	341,000
C. & E. Ill.	325	210,000		318,000
C., M. & St. P.	25,200	347,000	13,125	548,000
Wabash	450	189,600	12,200	305,000
C. & G. W.	19,579	334,000	23,705	410,000
A., T. & S. Fe	722	178,000	200	410,000
Wis. Cent.		48,000	450	2,000
L., N. A. & C.		224 000		1,000
Totals	86,728	5,919,000	100,686	6,545,000

The passenger business of the Western roads continues heavy. About every road reports an increased number of passengers carried both in and out of the city.

The Case of Troy (Ala) Before the Interstate Commerce Commission.

The Interstate Commerce Commission has issued a decision in the case of the Board of Trade of Troy, Ala., against the Alabama Midland, the Central of Georgia, and a large number of other railroads and water carriers, alleging unjust discrimination in favor of Montgomery and other cities as against Troy. The case was filed June 29, 1892, and was decided Aug. 15, 1893. The principal points decided are summarized in the head notes as follows:

1. The fact that the property and affairs of a carrier have been placed by a United States court in the hands of a receiver does not affect the jurisdiction of this Commission under a complaint charging such carrier with violations of the Act to Regulate Commerce.

2. The continuity of the carriage of freight over a line formed by two or more roads is not broken *in fact*, and cannot be broken in law, by the charge of a local rate by one (or more) of such roads as its proportion of the through rate.

3. The successive receipt and forwarding in ordinary course of business by two or more carriers of interstate traffic shipped under through bills for continuous carriage over their lines, is assent to a "common arrangement" for such carriage within the meaning of the Act to Regulate Commerce, without previous express agreement between them, and the obligations imposed by the statute cannot be evaded by the demand of the local charge for the haul over its own road by one or more of such carriers, or by the declaration on the part of one or more of said carriers that as to the transportation over its road it is a local and not a through carrier. (Reaffirming the doctrine laid down in Georgia R. Com. v. Clyde SS. Co., 4 Inters. Com. Rep., 120; 5 I. C. C. Rep., 324.)

4. A local rate, which presumably is adopted as covering both the initial and final expense of a local haul, is *prima facie* excessive as part of a through rate over a through line composed of two or more carriers.

5. Where a proportion of a through rate for part of a through haul is greatly disproportionate to the balance of the through rate, the knowledge of the circumstances and conditions (if any) justifying such disproportionate rate being peculiarly in the possession of the carrier, the burden is on the carrier to make proof of such justifying circumstances and conditions.

6. The facts, that one city is much larger and has more important and extentive business interests than another and has been treated by the carriers in making rates to surrounding points as a "trade centre," is no justification for a continuation of discriminatory rates in favor of such city. The object of the Act to Regulate Commerce was to eradicate the existing system of rebates and unjust discrimination in favor of particular localities, special enterprises and favored individuals.

7. Unjust discrimination as between localities or individuals cannot in the nature of things be essential to the business prosperity of the carrier, and it is no valid objection to the correction of unlawful rates to one point that it involves a like correction as to other points.

The Commission orders that the roads participating in the traffic involved cease and desist: (1) from charging and collecting on class goods shipped from Louisville, St. Louis and Cincinnati to Troy a higher rate than is now charged and collected on such shipments to Columbus and Eufaula; (2) from charging and collecting on cotton shipped from Troy via Montgomery to New Orleans a higher through rate than 50 cents per 100 lbs.; (3) from charging and collecting on shipments of cotton from Troy for export via the Atlantic seaports, Brunswick, Savannah, Charleston, West Point and Norfolk a higher rate to those ports than is charged and collected on such shipments from Montgomery; (4) from charging and collecting on cotton shipped from Troy to Brunswick, Savannah & Charleston a higher rate than is charged and collected on such shipments from Montgomery, through Troy, to those ports; (5) from charging and collecting on class goods shipped from New York, Baltimore and the northeast to Troy a higher rate than is charged and collected on such shipments to Montgomery; and (6) from charging and collecting on phosphate rock shipped from the South Carolina and Florida fields to Troy a higher rate than is charged and collected on such shipments through Troy to Montgomery.